WST2

Washington State Technology Transfer

Washington State Department of Transportation

A Technical Digest of the
Washington State Department of Transportation (WSDOT)
and the Local Technical Assistance Program (LTAP)
Issue 88, Fall 2005

Washington State Technology Transfer

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Washington State Technology Transfer Center
310 Maple Park Avenue SE
PO Box 47390
Olympia, WA 98504-7390

E-mail: WST2Center@wsdot.wa.gov
Home Page: http://www.wsdot.wa.gov/TA/T2Center/T2hp.htm

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Article contributions, questions, or comments are welcome. Please contact Larry Schofield, P.E., Technology Transfer Engineer, PO Box 47390, Olympia, WA 98504-7390; phone (360) 705-7380, fax (360) 705-6858, or e-mail schofil@wsdot.wa.gov.

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The opinions expressed in articles are not necessarily those of the editor.

Cover photo: *New South 38th Street bridge in Tacoma, Wasington.*

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The Local Technical Assistance Program (LTAP) is a national program financed by the Federal Highway Administration (FHWA) and individual state transportation departments. Administered through Technology Transfer (T2) Centers in each state, LTAP bridges the gap between research and practice by translating state-of-the-art technology into practical application for use by local agency transportation personnel.

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Washington State Department of Transportation

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WSDOT Bridge and Structures Engineer

Jugesh Kapur, P.E., S.E.
WSDOT Bridge and Structures Design Engineer

Most of us are aware of the automobile and truck driver's impatience with construction that disrupts the smooth flow of traffic. As a result of this impatience, there has been and continues to be a lot of emphasis on rapid construction methods as depicted by the phrase, "get in, get out, and stay out."

There are a number of schemes and construction methods being developed that are categorized as "rapid construction." A couple of examples are precast bridge elements and large mobile transporters. The entire west coast is struggling with precast substructure elements due primarily to seismic demands on present day connection methods. The University of Washington is conducting a study for the Washington State Department of Transportation (WSDOT) trying to recommend a reliable substructure element connection system.

In the meantime, I wish to describe two very successful bridge projects designed by WSDOT using some of these rapid construction ideas and techniques to meet the challenges in urban environments.

South 38th Street Bridge

When the 38th Street Bridge in Tacoma, Washington, needed replacement, WSDOT faced challenges common to urban bridge construction. It had to minimize traffic disruptions and reduce construction time. Located close to a major shopping center, retailers near the bridge were concerned about the loss of business during the holiday shopping season. To alleviate the retailers' concerns, it was agreed to delay construction until after the first of the year and complete the project before the next holiday season. By choosing precast concrete elements, the contractor was able to remove and replace the existing bridge in under 10 months. Precast concrete also allowed WSDOT to meet the local corridor theme aesthetic requirements.

As part of a larger project to widen the interstate through Tacoma, the existing 4-span, 228-foot bridge could not span the planned freeway widening and was substandard for the busy local retail traffic. The new 2-span, 325-foot-long and 106-foot-wide bridge was designed to carry additional lanes over the interstate and allowed future freeway widening. Instead of staging the project, WSDOT and the city decided to completely remove the existing bridge in order to complete the project as quickly as possible.

One of the main construction challenges faced was to minimize traffic disruptions to the interstate, the main north-south corridor through the city. Because of heavy traffic volumes, most of the temporary traffic revisions were limited to nighttime closures. In order to construct the bridge within traffic limitations and meet the vertical clearance requirements, WSDOT chose precast trapezoidal tub girders for the main spans. The 6-feet-deep tubs varied in length from 41 to 57 feet. In all, the superstructure consisted of 6 lines of girders with 3 precast tubs per span for a total of 36 tub girders. The footings, walls, and columns were constructed first followed by backfilling the intermediate pier. Temporary falsework for supporting the precast segments was then erected in the median of the freeway and at locations with minimum impact to the traffic lanes on the interstate

freeway. Tub girders were placed on the temporary falsework and concrete was placed in the bottom slab between the girders at span closure locations. Next, girder stops and end diaphragms were cast locking all the girders in place. To eliminate the need for deck falsework, stay-in-place precast deck panels were used. The 8 feet 3 inches wide by 4 feet long deck panels were 3-1/2 inches thick and pretensioned with 7/16-inch diameter strands. Since the need to construct and remove deck forms was eliminated, lane closures on the interstate were greatly reduced and all 766 precast panels were placed within a week of limited nighttime closures. After placement, the panels were adjusted for camber by leveling screws. The remaining 4 inches of deck was then cast in place. Concrete was then placed in the crossbeam, webs at span closure locations, and the intermediate diaphragms. The composite tub girders were then post tensioned, followed by removal of the temporary falsework. The final steps involved casting the traffic barrier and installing the pedestrian railing.

Aesthetics was a major concern during design. A corridor theme was developed to provide design guidance and ensure consistency throughout the corridor for various structures to follow. The preferred structure type was the box girder for its graceful horizontal appearance and shallow depth. As the first bridge in the corridor, this would set the tone of structures to follow. Precast tub girders provided the desired box girder appearance and profile, but without the time consuming and disruptive falsework required for a cast-in-place box.

Precast concrete enabled WSDOT to uphold a commitment to the city, local neighborhoods, and retailers to reopen the bridge within 10 months. The bridge also significantly reduced traffic congestion on 38th Street and provided for the future expansion of the interstate. Precast concrete ensured that the traveling public would have a functional, durable, and aesthetically pleasing bridge for years to come.

Continued on page 21.

Visit to British Columbia Ministry of Transportation 2005 Avalanche Technology Exchange

On March 4-9, 2005, John Stimberis from the South Central Region Avalanche Control Program visited the British Columbia Ministry of Transportation (BCMOT). The Border Technology Exchange Program (BTEP) sponsored this visit. The purpose of the visit was to learn about three of the Ministry's Snow Avalanche Programs for Highways, information storage/retrieval, avalanche defense, and weather station technology.

The BCMOT Snow Avalanche Programs for Highways operate in a similar manner to the Washington State Department of Transportation (WSDOT) avalanche control programs. The similarities include observing snowpack stability, following weather trends and forecasts, and conducting avalanche mitigation when necessary.

BCMOT staff receive more training than WSDOT personnel. The training includes several days of operational field training, and first aid training is significantly advanced.

Information storage and retrieval is important to forecasting avalanche and weather events and the BCMOT takes this seriously. The BCMOT has invested over one million dollars (US) in a database that stores and manages information related to avalanche occurrence, weather information, and related traffic concerns.

The BC avalanche programs are incorporating some innovative methods of operation into their weather stations. Their avalanche staff utilizes the Road Weather Information Systems (RWIS) as part of their normal operations.

The database and training requirements are two of the BCMOT avalanche program components that WSDOT will further evaluate to improve WSDOT's avalanche control program. The technology sharing experience is vital to staying current and informed about better ways of doing the public's business.

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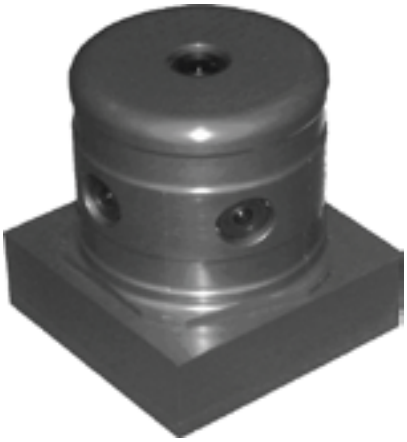
WSDOT's SRview

WSDOT's Transportation Data Office released their latest version of SRview software this year featuring 360-degree imagery taken at every 1/100th of a mile interval. SRview allows the end-user to view digital images of a Washington State highway forward, right side, and 360-degree views. These images can be viewed in both increasing and decreasing directions.

Since the Transportation Data Office first began collecting digital imagery on state routes back in 1996, SRview has become a valuable decision support tool used extensively throughout WSDOT.



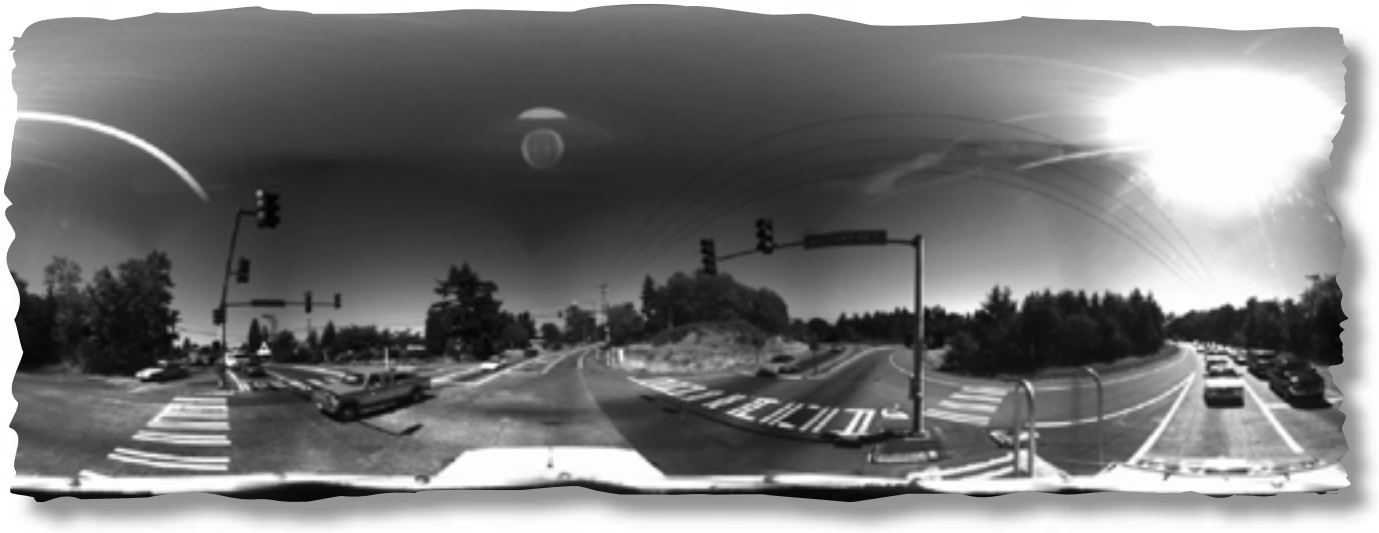
360° Camera

Over the past few years, several enhancements have been made to this product, which include adding a second camera, doubling the image resolution and the ability to capture images while driving at highway speeds. This ability alone has been a major safety improvement for both the equipment operators and the traveling public.

Most recently, a third camera was added, offering a 360° panoramic view of the surrounding area.

Using 360° digital camera technology and a custom panoramic viewer, the TDO provides a visual tool, covering all state routes, to help DOT staff view signs, area topography, utility objects, answer questions from the public, assist with permit applications and a host of other uses. A special six camera video head produces a constant stream of images. These six images are processed into single 360-degree image files and stored for later viewing. A sample panoramic image is shown below.

SRview 360 is a new product in 2005. SRview 360 will support many business areas within WSDOT, of which one key program is safety improvement. This product will also be used in planning and project scoping.



Panoramic view.

How to Make Better Individual Decisions: The 3.9 Critical Qualities

By www.KobyFleck.com, The Expert on Experts™

The latest issue of a national weekly newspaper recently arrived in my mailbox with the cover story: "The World's Most Admired CEO's." The headline prompted me to recall a recent study suggesting that nearly 90 percent of common stock investors will make their investment decisions based solely on their perceived abilities of a company's CEO.

This begs the question: *Can we put too much confidence in our own intuition or the wisdom of just one person, one expert, or one consultant when we make business decisions?*

Individual decisions are largely based on a limited scope of information. No matter how smart an individual is, they are likely to make erroneous business decisions at some point. The greater the volume of decisions one makes, the greater the probability that one will make miserable decisions.

Any expert's or consultant's singular advice is egregiously inadequate to help you reach your objectives. Often different "experts" in the same field recommend a host of different solutions for the same situation. Which answer is right?

A well-known mathematician is famous for saying, "Invert, always invert;" so let's invert for an answer. If one individual's advice is not always completely right, what if we did the opposite, and relied on a *group* of individuals to help us with important decisions?

Group decision-making is often written-off as largely counter-productive. A brilliant sociologist coined the term "Group Think" to describe the tendency of groups of similar individuals to think or mis-think in the same way.

However, consider the television program *Who Wants to be a Millionaire?* that gave its contestants three options to aid their decision-making.

When show contestants consulted their pre-selected "expert," the expert suggested the right answer more than 60 percent of the time. These are pretty good odds — but interestingly enough, the aggregated answers of the voting audience were right more than 90 percent of the time. Granted, a game show is not the most rigorous academic or scientific arena to solicit data; but a host of scientific research into the topic suggests that the collective wisdom of crowds is nearly perfect when four criteria are met.

To be accurate, a group must make decisions independently of each other, decision making must be decentralized and close to the problem, the individuals in the group must come from diverse social/educational backgrounds, and there must be a consistent way of aggregating the groups collective decision making.[1] (See the end of this article to obtain a free white paper describing how to implement these qualities.)

My point is this: *The collective wisdom of groups can be fairly accurate and their collective wisdom can support an individual's decision making.*

Whether you are a CEO of a business or the CEO of your own life, you must make individual decisions. Since you are closer to your problems, challenges, or opportunities than anyone else, you should by default be more qualified to determine which ideas can help you reach your goals. Remember, though, that your proximity to a situation can limit you: you may be handicapped by your own thought processes, biases, incentives, and information.

The Solution

Look externally and aggregate the best ideas you discover into your existing business processes, then monitor which ideas work and which ideas do not work. Draw ideas from the collective wisdom of others. Napoleon Hill shared that "A group of brains coordinated in a spirit of harmony will provide more thought energy than a single brain, just as a group of batteries will provide more energy than a single battery."

[1]Reference, *The Wisdom of Crowds*, by James Surowiecki.

When facing an important decision, consider incorporating the collective wisdom of others, based on the four requirements discussed, into your tactical or strategic decision making. It could give you the advantage you need to be a more successful, individual, decision maker.

Free by Fax: I've developed a short white-paper that will give you the action plans you need to implement these four qualities into your personal or professional life. To receive it, fax your letterhead with your name and the word "Decision" to (440) 919-6555 or e-mail the same info to Decision@KobyFleck.com.

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New Law Allows Cities to Use Red-light Cameras

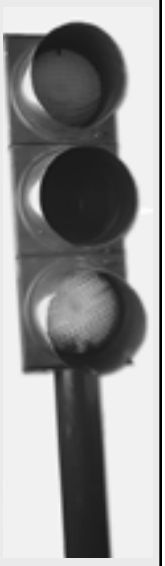
Following several years of study, the 2005 Washington State Legislature authorized the use of automated traffic safety cameras. RCW 46.43 took effect on July 24, 2005. In 2000, the Washington State Legislature directed the Washington State Traffic Safety Commission to select, monitor, and evaluate automated enforcement sites within Washington State and set out guidelines. The program was extended and expanded in 2001. The purpose of the pilot project was to reduce the number of deaths and serious injuries resulting from traffic crashes. Lakewood was the first city in Washington to participate in the pilot project.

After reviewing the results of the pilot project in Lakewood, the legislature decided to expand the availability of intersection cameras to other jurisdictions. Under the legislation, city and county legislative bodies would have the option to photograph the license plates, but not the faces, of drivers who fail to stop at red lights.

Signs along the roadway leading to the intersection warn drivers that the cameras are in use. A police officer must also review each photo before the ticket is issued and vehicle owners will have the opportunity to challenge a citation.

The new law makes this technology more attractive to cities than it was a few years ago. Lakewood officials liked the technology, but they said it cost more than it generated for the city. The city had to send a portion of the ticket revenue to the state, and a portion to the vendor they contracted with to supply and operate the equipment. The city helped push for the new law. The new law has tickets generated by machine and they are treated like parking tickets. This means cities are not required to send part of the ticket revenue to the state. Treating machine-generated tickets like parking tickets also means the infractions are not moving violations and do not go on a driver's record.

According to the Washington State Department of Transportation, from 2001 to 2003, 9,807 drivers were injured or killed in collisions in which a vehicle ran a red light. Three out of five red light collisions occurred on local city streets.



The law also includes strict limits on where cities can use automated traffic enforcement equipment. The devices may be used only to ticket drivers who run a red light at an intersection of two arterials, speed in a school zone, or violate the rules of a railroad crossing.

Success of the Washington State Road Safety Conference May Mean a Repeat in Two Years Time!!

The first-ever Washington State Road Safety Conference, which was held in Tacoma August 30 through September 1, 2005, was a great success. Hosted in the new Greater Tacoma Convention and Trade Center, the conference focused on low-cost and innovative roadway safety solutions that have proven crash reduction statistics. The conference was organized around three safety solution "tracks": Rural Roadways, Intersections, and Pedestrian/Bicycles. Each track featured several presentations of solutions to dangerous traffic conditions that are found in that specific area of roadways.

Presentations on "hot topics" that are gaining momentum on road projects in Washington State included shoulder and centerline rumble strips, roundabouts, pedestrian friendly road and sidewalk designs, and new ideas in rural roadway signing. These features are gradually changing the face of our roadways as they are increasingly being incorporated into local agency projects.

Other effective solutions presented at the conference included red light cameras and red light running prevention, pavement edge refinements, and active community participation in "driver behavior" safety solutions.

One hundred forty-four people, nearly half of who represent local agencies across Washington State, attended the conference. Conference attendees indicated that they would incorporate several of the safety solutions that were described in their upcoming road improvement projects.

Due to the positive reports from attendees describing the value of the information presented, the conference is being considered as a future event.

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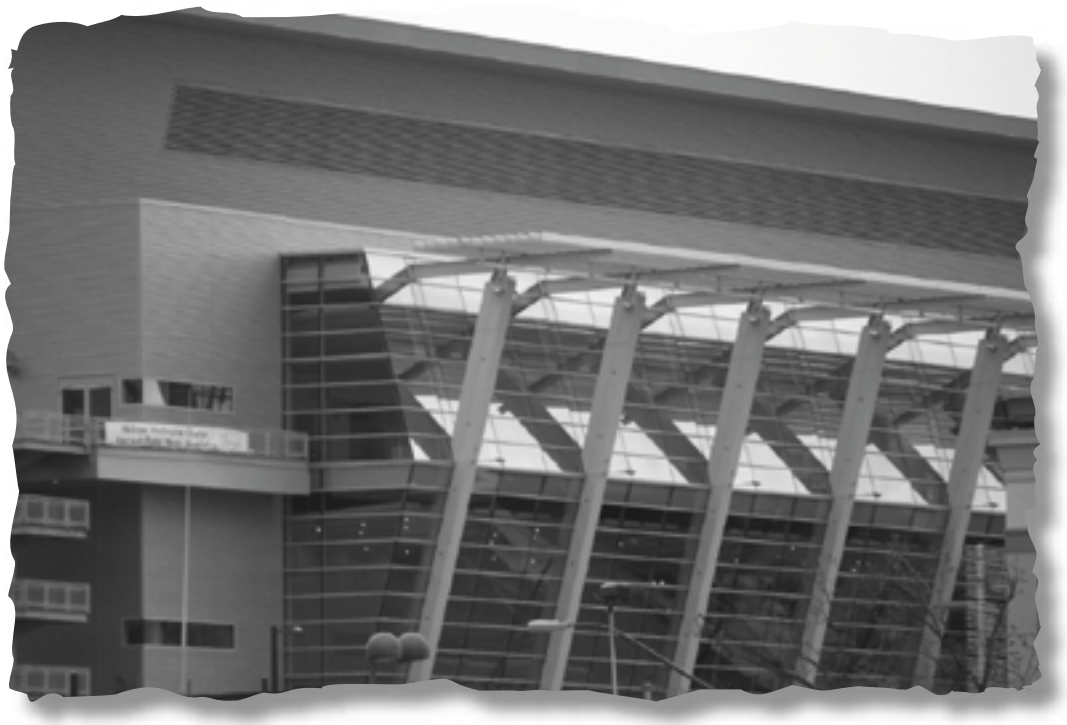

Greater Tacoma Convention and Trade Center – Site of the 2005 Washington State Road Safety Conference

City of Vancouver Installs "Countdown" Pedestrian Signals on 4th Plain Boulevard

Countdown pedestrian signals have been appearing at intersections around the country in the last couple of years without much fanfare.

On September 27, 2005, the City of Vancouver finished installing pedestrian countdown signals at 17 intersections along Fourth Plain Blvd. Fourth Plain Blvd is one of the city's busiest arterial streets for vehicles, bicycles, pedestrians, and transit. The project was completed as part of the Fourth Plain Traffic Safety Project, which is a part of the City/County Corridor Safety Program, and was funded by a Federal safety grant.

The first of these intersections had the countdown signals installed at a media event that included the mayor and other city officials as the first "official" people to cross using this new technology for the City of Vancouver. The new signal display resembles a standard pedestrian signal with the addition of a numeric countdown display (See photo below). The numbers displayed represent the number of seconds remaining for a pedestrian to reach the other side of the roadway. The numbers are displayed during the Flashing Don't Walk phase of the standard pedestrian signal display, as required in section 4E.07 of the 2003 Manual on Uniform Traffic Control Devices (MUTCD).

Pedestrian countdown signals increase safety by giving the pedestrian real-time information to make informed crossing decisions. The new countdown signals will help to decrease the number of people who cross Fourth Plain Blvd when there is not enough time left for that movement. The signals will also allow faster pedestrians to get across the street when there is ample time left to cross the roadway. Hopefully, the signal will reduce the number of pedestrians stranded in the crosswalk when the signal changes for a different traffic movement to begin. The use of countdown signals is gaining momentum as jurisdictions look for low cost engineering solutions that provide good safety benefits.

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WSDOT Creates a "Consolidated" Roundabout Website

The Washington State Department of Transportation (WSDOT) created a new website devoted to the subject of "Roundabout" intersections. Roundabout subject matter had been a part of various web pages within the WSDOT website prior to now. This new consolidated website provides a central information source to which engineers and communications specialists within WSDOT can direct public and media inquiries. Users will find accurate answers for most general questions on the use of roundabouts in Washington State. Local agencies, some whom have developed their own websites in the last couple of years to highlight their own "Roundabout" projects, will find the WSDOT website gives a statewide graphical representation of where roundabouts are being built in the state. There are currently 78 roundabouts in Washington State. Figure 1 illustrates the geographic map in the WSDOT website at http://www.wsdot.wa.gov/projects/roundabouts/

Figure 1
Statewide Map of Existing and Planned Roundabouts in Washington State

Education Value

Because roundabouts are relatively new to the U.S. roadway network, the need to educate the public is essential during the development of a project involving roundabouts. An example is how large trucks use roundabouts. The design of a roundabout on a state highway requires that the largest legal truck on the U.S. roadway system is accommodated much like it would be at a traditional intersection. Both truck and passenger vehicle drivers are usually skeptical at first that a roundabout can handle this size of truck efficiently and safely. The website illustrates how a design element known as a "truck apron" is essential for efficient operations of the largest trucks in smaller single lane roundabouts. At multi-lane roundabouts, truck aprons may be used; however, trucks generally find it is far safer and more efficient to occupy both lanes as they enter, circulate through, and exit the roundabout. Current operations at 17 multi-lane roundabouts in Washington State prove that this practice is efficient as well as safe due to the low speeds traveled in roundabout intersections. Figure 2 shows a large truck using a truck apron at a single lane roundabout.

Figure 2
Photo of a Large Truck using a well-designed truck apron in Cle Elum, Washington.

The website helps answer these sorts of questions that have been asked numerous times by the media and traveling public.

Website Will Be Updated Periodically

The transportation industry and more community planners are seeing the need to educate the public on roundabouts. Roundabouts have been in existence in their present form for 40 years in most parts of the world, notably Australia, the United Kingdom, and France. The website will continue to evolve to meet the needs of the traveling public and WSDOT. There is little information about the environmental and aesthetic value of roundabouts. It has been suggested that roundabouts reduce harmful emissions from vehicle exhaust because of their function to allow vehicles to keep moving. They allow less delay than signalized intersections and less delay means less fuel burned. There is also the philosophy that roundabouts are an aesthetically pleasing traffic solution, which is developed from context sensitive design. Community values have begun to dictate how roadways look within each community. It is important that traffic engineers have the modeling tools to compare safety and delay as well as factual information that can be shared electronically. WSDOT should be commended for pulling together information that assists the public in getting accurate facts on roundabouts and their contribution to a safer highway system.

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Douglas County Transportation CRView System

Designed and Built by Justin Roozen

Justin Roozen, Road Data and Environmental Coordinator for Douglas County Transportation in Washington State, designed and built a system called CRView, short for County Road View, to aid in the maintenance of the county's road inventory. CRView is a road imaging system that ties together photographs of roads and the mileposts with maps of the roads. The maps serve as a portal to finding the photographs.

Justin uses CRView to update the road data so that the information it contains is usable.

Here is Justin's description of how he designed, built, implemented, and is now using CRView in Douglas County, Washington.

My first task was to create a CRView system that was scaleable based on my agency's resources.

The initial design and construction of the system was limited by the funds that were available to invest in it. I was able to utilize some equipment the county already owned, thereby saving some money. It was necessary to purchase only a few items in order to make the system work. I found that the quality of the photos is often directly proportional to the price of the camera used to take them. High-quality photos are desirable, but one has to compromise sometimes in order to stay within one's budget.

We had to decide who should have access to the system. Accessibility can range from its being located on one computer's hard drive to being on the agency's intranet so the employees can access it, to being in a web interface accessible from outside the agency.

The beauty of this system is that it can be run and maintained by one person.

Figure 1
Yes, two monitors are better than one.

My next task was to build a system utilizing as much in-house equipment as possible.

Below is an itemized list of necessary equipment for my system:

1. **Digital Camera** – I use an old Sony Mavica digital camera that uses 3.5" floppy disks. I know what you may be thinking here, but the quality to size ratio of the images is quite good. It seems they used fairly good optics in these old cameras. At the lowest quality setting, I manage to get around 30 pictures to a disk at 40Kb per picture. I wanted to keep the image size as small as possible without sacrificing usability.
2. **Relay Controlled Camera Trigger** – I obtained a 5V relay from Radio Shack that I wired into the trigger for the camera. Soldering skills and a willingness to crack open a perfectly good camera are necessary for this item.

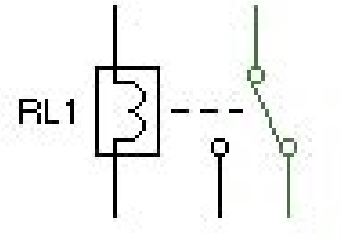

Figure 2
SPDT Relay

3. **DMI** – Most Douglas County vehicles have these installed. My vehicle has a Nu-Metrics NC-60. Nu-Metrics makes a model below this, the NC-50, which also works for this application.

4. **DMI Signal Amplifier** – This is used to increase the signal strength needed to trigger the Relay.

5. **Laptop Computer** – I started with a Pentium II Dell Laptop that was used as a map and for picture storage. I have upgraded to a rugged Tablet PC, which I highly recommend.

6. **GIS** – I use Mapinfo Professional 7.8 daily for mapping road data. I found that Mapinfo offers me what I need. The added bonus is that they have a free viewer that allows you to use a hyperlink tool (I will discuss this later).

7. **GPS** – I use a Bluetooth GPS placed in a homemade housing mounted on the roof of the vehicle for maximum reception.

8. **File Renaming Program** – I use a program called "THE Rename - February 2004 - by Hervé Thouzard." This is one of many freeware applications available that I found works best for me.

The only major pieces of equipment I needed to purchase were the DMI signal amplifier and the Relay. The Tablet PC and Bluetooth GPS receiver were the most useful upgrades to me.

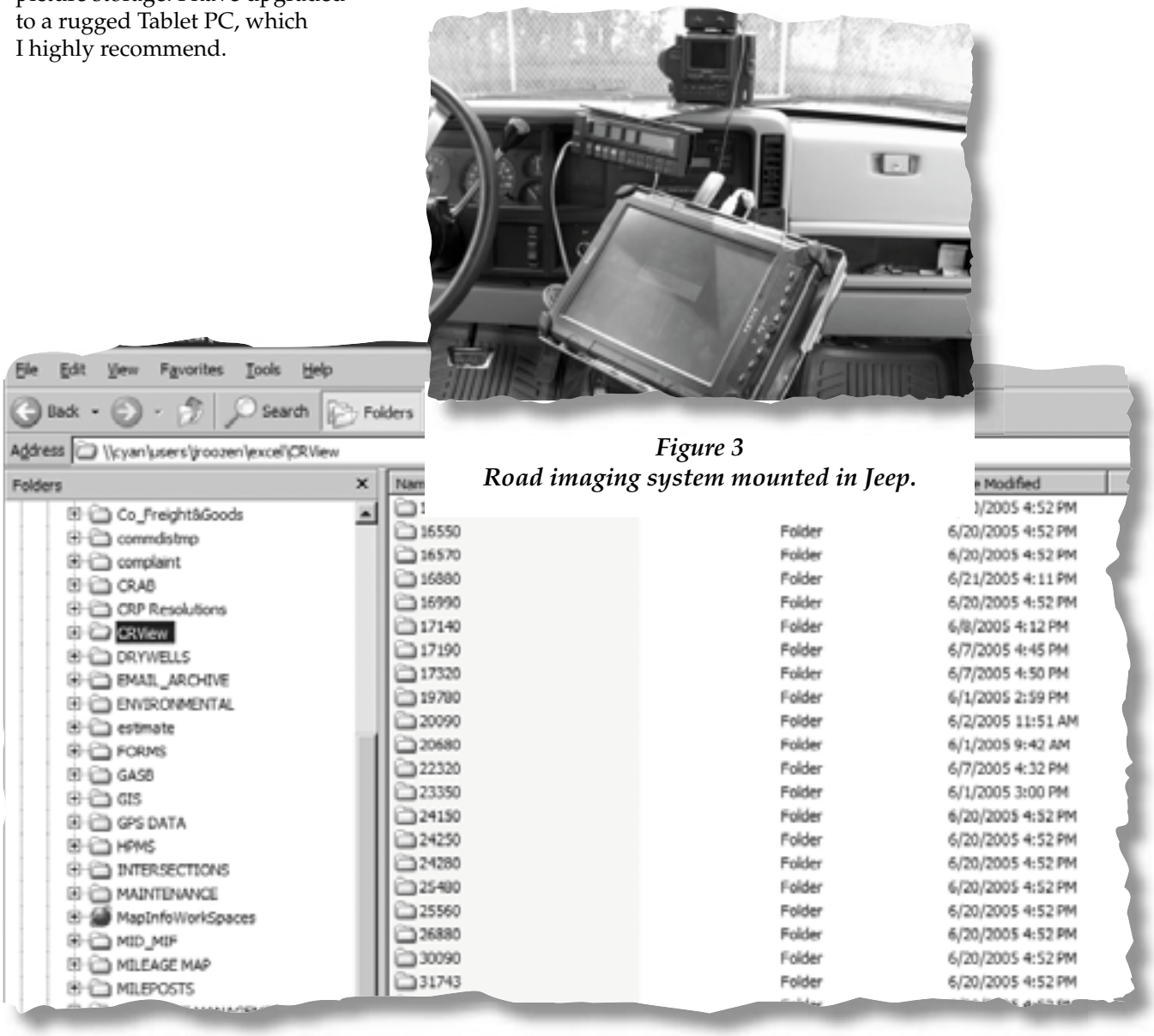

Figure 3
Road imaging system mounted in Jeep.

Figure 4
File system, each road has its own folder for pictures.

My third task was to build the imaging system.

I started by opening the camera and following the wires to the manual trigger. I soldered the correct trigger wires to the relay. The relay was put into a project box from Radio Shack and mounted on top of the camera. I connected the Amplifier to the DMI and connected the correct wires to the Relay. I programmed the DMI, which sets the length and interval at which I wanted the pulse to be released.

When I have finished taking pictures along the length of the road, I transfer them to the computer's hard drive. I made a folder for each road and assigned the road number as each folder's name, then transferred the photos for each road into its own folder.

Then I concentrated on a system to track and mark roads that have been run with the system. By using Mapinfo Professional 7.8 in combination with GPS I am able to find, drive and mark county roads. After the road is driven, the road line is marked and color-coded then I move on to the next desired road.

My last task is using the system and filing the images.

After a day in the field, I bring the picture files into the office for processing. I start by using the renaming program to name the files in sequential order. I name the picture files with the road number followed by a sequential number, then move them into the matching road number folders. I link each photo to the corresponding point on the map of that road. Once the picture files are all placed in the correct folders and are linked to their corresponding milepost point on the map, you simply click on a point on the map and the picture of the road at that location will appear.

Mapinfo has created a free viewer that enables anyone in your office intranet to use this system. In our system, the picture files are stored on a server to which everyone has access by the network. I am working with our Website Designer on a simple interface that will allow the public to view the images. At the time of this writing, we have cataloged all county arterials and collectors and we are working on the local access roads.

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Figure 5
By simply clicking on a point on the map, the corresponding road image appears.

WSDOT Pavement Guide — Interactive CD-ROM

The Washington State Department of Transportation's (WSDOT) Pavement Guide is now an interactive CD-ROM and has become even more useful to anyone who is involved with the planning, design, construction, or evaluation of pavements. This Pavement Guide is easy to use and readily accessible to anyone who has a computer with a CD drive. The ability to find what you "need to know" is at your fingertips. It is very effective in helping engineers understand pavement design, construction, and the assessment of pavements throughout their lifecycle.

The CD-ROM includes the information from all three volumes of the old Pavement Guide. Volume 1, which described WSDOT pavement design policies for flexible and rigid pavements, new and rehabilitated pavements, and the pavement type selection process. Volume 2, which covered an overview of pavement structures, materials, fundamental design parameters, mix design methods, pavement evaluation, flexible and rigid pavement responses and related design processes, the AASHTO flexible and rigid pavement design procedures, pavement rehabilitation, life cycle cost analysis, subsurface pavement drainage, and various construction considerations. And Volume 3, which discussed three pavement design programs developed for WSDOT: the pavement layer elastic analysis program EVERSTRS, the pavement layer back calculation program EVERCALC, and the empirical-mechanistic overlay design program EVERPAVE.

In addition to the original text, the CD-ROM incorporates over 200 photographs, illustrations, animations, and videos. The information has been updated and expanded to include new mix design methods (Superpave), performance graded (PG) binders, recycling options, construction issues, and more. Particularly useful are the large number of new, full-color construction photos, animations, and videos. Another feature of the CD-ROM version is that it includes interactive AASHTO Guide pavement design equations (not WSDOT's design programs – they can be downloaded at: http://www.wsdot.wa.gov/biz/mats/Apps/EPG.htm). Another useful feature, where applicable, are the WSDOT Practices listed within the modules. WSDOT Practices refer to typical WSDOT specifications and explain WSDOT requirements and how they are used or applied. Videos on the CD include a digitized version of the 20-minute videotape, *Guidelines for Spring Highway Use*, which discusses the issues related to spring load restrictions and presents guidelines for determining where to apply load restrictions, how much to restrict loads, and how long to enforce them.

The Interactive Pavement Guide is a perfect addition to any city or county engineer's collection of reference and training tools. It includes WSDOT's pavement design policy, references many WSDOT specifications, requirements, and guidelines, and is very useful as a training or education tool on pavements.

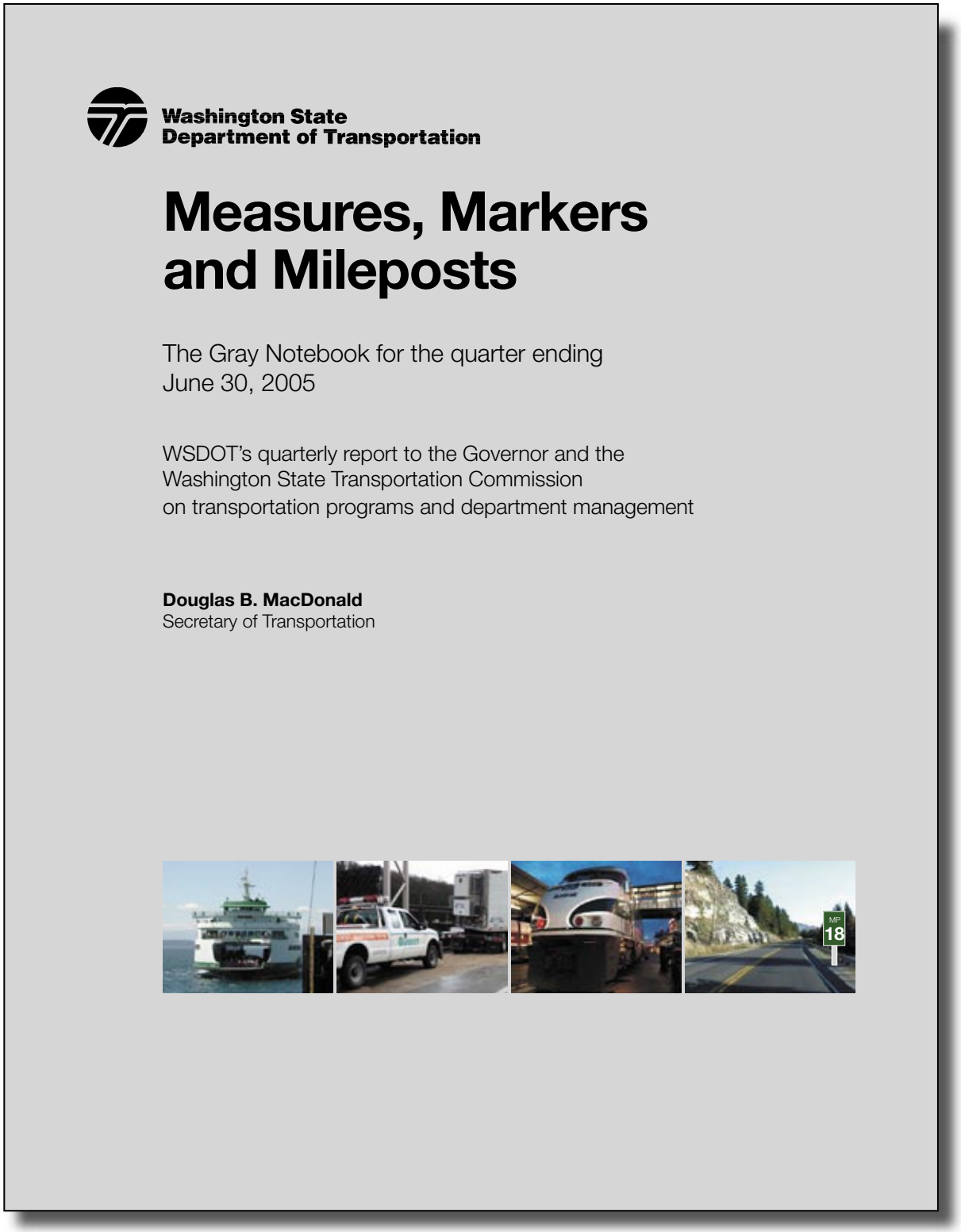
The University of Washington (Joe Mahoney, Steve Muench, George White, and George Turkiyyah), in conjunction with the WSDOT Materials Laboratory, created the Interactive Pavement Guide through a research project. The CD-ROM is available for $15.00 through WSDOT Engineering Publications at: http://www.wsdot.wa.gov/fasc/EngineeringPublications/order.htm.

▲

For more information, contact Kim Willoughby in the WSDOT Research Office at (360) 705-7978.

Gray Notebook

The *Gray Notebook* is a quarterly publication published by the Washington State Department of Transportation to track a variety of performance and accountability measures for review by the Transportation Commission and others. The following is a sampling from this document. For an on-line version of this or a previous edition of the *Gray Notebook,* visit http://www.wsdot.wa.gov/accountability/



Highway Maintenance

Winter Field Test Results for Anti-Icers

2002 - 2005 Winter Field Test Results

Field testing different materials and methods is one way WSDOT learns how to make highways safer for winter driving. Here are two examples of field research aimed at improving winter roadway safety while safeguarding vehicles and the environment.

WSDOT Continues Anti-Icer Evaluation

Maintenance crews use a variety of liquid and solid anti-icers (ice-melting compounds). For the past three years, WSDOT has been evaluating different anti-icers on test sections of highway, measuring differences in operational costs, performance, corrosion, and environmental impacts. The information gained from these tests is helping WSDOT find the best balance of factors in selecting anti-icers. (see map below)

Comparing salt to corrosion-inhibited anti-icers

During the first two years of testing, results using salt were compared to results using corrosion-inhibited anti-icers. Although the unit cost of salt products is considerably less than the unit cost of corrosion-inhibiting anti-icers, overall costs at the end of a winter season are similar. This is because more salt has to be used, and applied more often, to achieve roadway condition results similar to the corrosion-inhibiting anti-icers.

The performance of salt was similar to that of corrosion-inhibiting anti-icers in keeping roads bare and wet during snowy or icy winter conditions. The corrosion-inhibiting anti-icers proved to be consistently less corrosive to steel on motor vehicles than salt, but corrosion to sheet and cast aluminum on vehicles was mixed. In some cases, salt was more corrosive to aluminum. In others, salt was less corrosive to aluminum.

Environmental impacts from the use of salt were similar to impacts from the use of corrosion-inhibiting anti-icers. In both cases, chlorides detected in roadside soils and water were far below levels of concern for the protection of the environment and public health. At the end of two years, field-testing data indicated that WSDOT's emphasis on corrosion-inhibiting anti-icers appears to be preferable when compared to an emphasis on using salt.

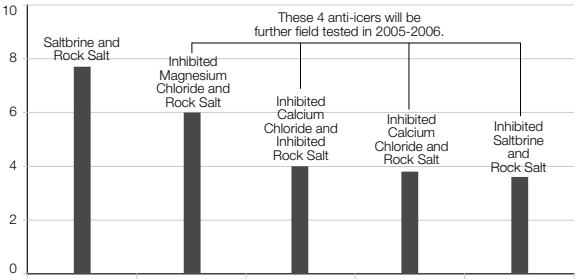
Mixing and matching approaches to testing

During the third year of testing, mixing and matching of different anti-icers was evaluated to find the most cost-effective combinations. One approach was to spray corrosion-inhibiting anti-icers on salt as it is applied to the roadway. This practice is known as pre-wetting rock salt.

With the pre-wet rock salt, WSDOT achieved results similar to the previous standard practice, but with cost savings of approximately $50 per ton. Because WSDOT uses thousands of tons of solid anti-icers statewide each winter, this appears to be a possible approach to achieve significant cost savings.

Based on these field tests, WSDOT will continue using corrosion-inhibiting anti-icers (rather than regular salt products) for highway snow and ice control. However, the testing of pre-wetting rock salt as described above will be repeated and monitored next winter to assure that WSDOT can further stretch taxpayer dollars without sacrificing safety, corrosion costs, or environmental impacts.

Corrosion of Steel Caused by Anti-Icers
Weight Loss in Steel on Maintenance Trucks



Winter Field Test Results for Pavement Markings

2002-2005 Winter Maintenance Field Test Results

WSDOT has gradually been increasing the use of anti-icers and relying less on sand for snow and ice control. This means less wear on pavement markings. But it's still a rough and destructive winter if you're a pavement stripe on Snoqualmie Pass.

Test of Pavement Marking Materials on I-90 Yields Promising Results

On I-90 over Snoqualmie Pass, pavement stripes wear out in a very short time, leaving the roadway without reflective lane markings. Pavement markings are affected by tires (especially studded tires or chains) and sand that wear away the reflective surface. Rainwater covers the marking and limits visibility and reflectivity. And in the winter, snowplows scrape off the reflective surface. The stripes are repainted twice a year.

Over the years, drivers have asked for more durable and visible markings on the pass. WSDOT has tried a number of approaches; none have solved the problem. Even materials that routinely survive cold snowy winters in the Midwest have been unable to withstand winter conditions on Washington's most-traveled mountain pass.

Last winter, however a test of a new pavement marking materials showed that at least one type of reflective striping came through the winter at the summit with excellent results. Although the 2004-2005 winter was not as harsh as previous winters have been, this is promising news.

Pavement markings help make roadways safer.

Since the 1940s, pavement markings have included a "retro-reflective" aspect. This means that in the dark, these markings reflect light back to the driver and show the lane edges clearly.

Finding markings that can survive the winter

To conduct the pavement marking test, five 3,000-foot test sections were selected on I-90, from North Bend (milepost 32) to Easton (milepost 72), including a test area near Snoqualmie Summit. These five locations approximate almost all climate conditions found in Washington State, and allow WSDOT to evaluate the pavement marking materials in distinct types of winter conditions. Before winter weather set in during September and October, 2004, seven vendors or manufacturers placed 75 test marking stripes.

To protect the striping materials from being scraped off by snowplows, in some test areas WSDOT ground 0.10-inch to 0.30-inch inlay grooves into the pavement (dependent on test material application thickness.) The spray-on or tape pavement markings were placed in the inlay grooves.

At the evaluation in April 2005, WSDOT found 57 test markings out of the 75 total test markings (75%) had withstood the winter and retained enough reflectivity to meet acceptable levels.[1] The pavement markings, which vary widely in cost, also varied in durability depending upon the conditions. At least one of the products maintained adequate retro-reflectivity in the harshest conditions, near the summit of Snoqualmie Pass.

This test section, photographed in April 2005, 6 months after being placed, retains its retro-reflectivity, while the normal paint striping (on the right) was no longer retro-reflective

A close look at the product that proved most durable and retro-reflective, a methyl methacrylate textured marking, after the 6 month winter field test

WSDOT will develop a pavement marking plan for I-90 to provide an economical year-round stripe, based on the test. Final recommendations will be built into WSDOT's 07-09 budget proposal. The information gained from the Snoqualmie Pass field evaluation will also be valuable in the future for selecting the most successful and cost-effective marking materials for construction projects, mountain passes and problem pavement marking in other areas of the state.

1 The United States Department of Transportation and Related Agencies Appropriations Act of 1993, safety.fhwa.dot.gov/roadway_dept/retro/gen/cong_mandate.htm called for standards to be set, governing minimum maintained retro-reflectivity for highway signs and pavement markings. For signs, those standards are nearly finalized. Standards for pavement markings have been proposed, and may be finalized within two years. At this time, draft standards for pavement markings are being considered.

Transportation Benchmarks
Annual Update

As of December 31, 2004, WSDOT owns and maintains 20,002.88 lane miles of highway, including ramps, collectors and special use lanes. Special use lanes include High Occupancy Vehicle (HOV), climbing, chain-up, holding, slow vehicle turnout, two-way turn, weaving/speed change (previously referred to as auxiliary), bicycle, transit, truck climbing shoulder, turn and acceleration lanes. There are approximately 69 lane miles under construction. Special use and ramp/collector lane miles make up 1,688.02 of the 20,002.88 lane miles.

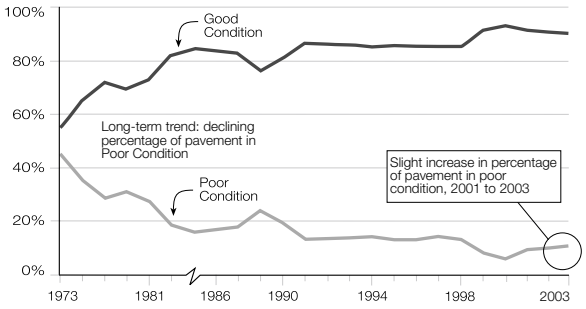
Pavement Condition Rating Summary 2000-2004

Percent of Pavement in Poor Condition

2000	2001	2002	2003	2004
6.1	8.9	9.3	10.0	10.1

Source: WSDOT Materials Lab

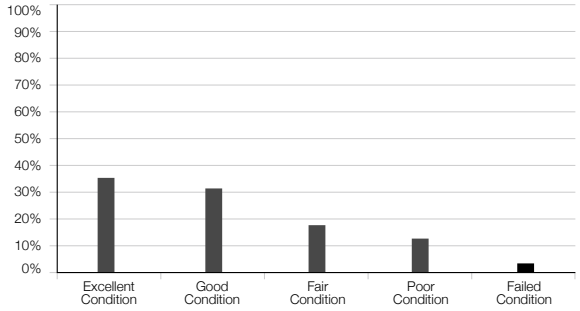
State Highway Pavement Trends, 1973 - 2004



Source: WSDOT

2004 Local Arterial Pavement Conditions

Percentage and Condition



Source: WSDOT

Local Arterial Road Pavement

For the 2003-2005 biennium, Washington State's cities and towns are required to provide data on at least 70% of the total arterial road network in the state. In 2004, 27 cities provided WSDOT data on the condition of 1,598.61 centerline miles[1] of arterial roads. These miles represent 80% of the city and town arterial network. This is the first time that this data has been available to report in the *Gray Notebook*.

The cities calculated their pavement condition using Pavement Condition Index (PCI) (see gray box below) that encompasses such distresses as cracking, patching, rutting, waves, sags and humps. In 2004, 1,336 centerline miles, or 83.6% of arterial roads included in the Arterials Condition Report, were found to be in "fair" or better condition. For more information on arterial road conditions, please see Washington's City Arterials Condition Report 2004, available at www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology.

The arterial network carries a significant amount of commuters as well as freight distribution within the state, and having current and accurate condition data on the city arterials of the network allows for realistic planning and budgeting to maintain and improve the system. This has direct benefit to the traveling public and the state's economy.

[1]*One centerline mile is one mile of pavement measured along the center line of the road.*

Pavement Condition Index (PCI), primarily used by local agencies in Washington, and Pavement Structural Condition (PSC), primarily used by WSDOT and some local agencies, are very similar in concept. Both measure cracking and patching, and PCI includes environmental and ride quality measures. The major difference between the two ratings is in the values that are assigned to the different types of pavement distresses and the additional surface defects included in PCI. WSDOT's PSC is based on pavement distress characteristic of state highways, which see heavier traffic than city arterials and are maintained at a higher condition level. The PCI is not as strict as the PSC rating, and cities will generally allow more distress to occur on their pavement before rehabilitating it.

Continued from page 3.

Lewis and Clark Bridge

The existing Lewis and Clark Bridge was constructed by the private Longview Bridge Company and opened to traffic as a toll bridge in 1930. This historic bridge spanning the Columbia River between Longview, Washington, and Rainer, Oregon, was designed by Joseph A. Strauss of Golden Gate Bridge fame. The bridge consists of a 2,720-foot-long main through truss section, a 927-foot-long deck truss section on the Oregon side, and a 168-foot-long deck truss and a 1,507-foot-long, 12-span rolled beam section on the Washington side. See Figure 1 for details.

A 30-year preservation plan completed in 1991 by WSDOT detailed nearly $30 million in work to keep the bridge structurally sound. The overall condition of the bridge was characterized as fair to poor. The most immediate needs were the deck replacement on the through and deck trusses, and widening the existing deck on the Washington approaches and a portion of the Oregon approach. Seismic retrofit of the existing expansion bearings, painting, and other remedial work on both approaches constitute a majority of the other work that was recommended. The existing floor beams were in fair condition with many of them having a section loss of 5 to 25 percent on the top flanges. It was decided that the floor beams, except for being cleaned and painted, did not require rehabilitation, provided a stress reduction could be achieved with a new deck system. State and local governments agreed that rehabilitating the bridge was more practical and financially feasible than building a new bridge.

Both WSDOT and the Oregon Department of Transportation (ODOT) met with the local business community and the general public for input on traffic control restrictions for the project. Based on this feedback, the project was set up to close the bridge to vehicular traffic to accommodate the through and deck truss deck panel removal and replacement within 8 hours from 9:30 p.m. to 5:30 a.m. A total of 103 precast deck panels with a constant width of 36 feet and lengths varying from 25 to 45 feet were placed on the trusses. For the widening of the Washington approach and a span of the Oregon approach, 48 precast deck panels with a constant width of 4 feet and variable lengths of 58 to 70 feet were required. The widening of the approaches was accomplished using single lane closures. To perform the overall work, the contractor was limited to 120 days of 8-hour night closures and 200 days of single lane closures. The contractor was allowed a weekend closure to test both equipment and procedure for the replacement of the full-width deck panels. In addition, the contractor was allowed two weekend closures to place a concrete overlay on the approaches and complete a bearing retrofit.

The existing lightweight deck in the through and deck truss sections had a unit weight of 120 pcf and was supported by six stringers spanning between floor beams as shown in Figure 2.

Because of the section loss suffered by the floor beam flanges, and the desire to retain these steel members in the rehabilitated structure, it was decided to reduce the dead load stresses in these floor beams as much as possible. This, coupled with an allowable construction window of only 8 hours necessitated the use of a twin longitudinal girder system spanning between the existing floor beams. The longitudinal girders, in turn, were connected by a series of intermediate transverse stringers as shown in Figure 3. This precast deck panel system not only reduced the dead load stresses on the floor beams by 40 percent, but also reduced the number of connections to the floor beam from six to two, thereby saving valuable installation time. The weight of new deck panels was only about 4 percent lower than the removed deck section. The precast full-width deck panel was designed to sit on preinstalled beam seats. The seats consisted of two channels C15x33.9 attached to the floor beam and a wide flange W16x100 attached to the channels as shown in Figure 4. Though the plans called for shop drilling the holes in the beam seat for attachment to the longitudinal girders, the contractor proposed, and received approval, to field drill the holes in the beam seats for better fit of the deck panel. After installation of the panel, the longitudinal beams were attached to the existing floor beam stiffeners by plates as shown on Figure 4. Minor variations of the beam seat were used at the finger joint locations and on the Oregon and Washington approaches. The replacement lightweight precast deck panels had a preinstalled 1-inch-thick latex modified concrete overlay to provide long-term durability for the deck. For the most part, the contractor did not have any problems installing the deck panels in the 8-hour closure period.

Table 1 shows the concrete mix proportions for the lightweight concrete deck.

To match the new roadway cross-section on the trusses, the approaches with the rolled beam spans were widened on both sides of the roadway deck with precast slab sections. These sections were placed directly on the widened cross-beams using single lane closures. See Figure 5 for details of the precast sections. To smooth the transition between old and new deck, a 1½ inch rapid set latex modified concrete overlay was placed during a weekend closure.

The contract plans had an engineer's suggested method for replacement of the deck panels for both the through-truss and deck trusses: for the through-truss, it consisted of a crane rail system and for the deck trusses, a special lifting frame with a crane rail system attached. The contactor proposed an alternate system, which used a single system for replacement of the deck panels in both the through-truss and deck trusses. The contractor's method was found to be acceptable after careful review of the proposal, which included a detailed analysis of the existing structure for the proposed heavy construction loads.

The lifting operations associated with the replacement of the deck panels were designed and executed by the subcontractor MAMMOET USA, INC; Rosharon, Texas. The lifting system consisted of two self-propelled modular trailers with a specially designed lifting truss spanning the trailers. Air hoists were used to remove the old deck panel and lower the new pre-cast deck panel into place. Figure 6 shows the trailers and the lifting truss and the sequence of operations involved in removing and replacing the deck panel. Table 2 below shows the break down of the lifting loads. Figure 7 illustrates a fully constructed deck panel being readied for transportation to the site.

Material	Quantity (per cyd)
Portland Cement	600 lb.
Fly Ash	80 lb.
Fine Aggregate	1158 lb.
Coarse Aggregate	1114 lb.
Total Water	270 lb.
Air Entrainment (Daravair)	3.2 oz.
Water Reducer (WRDA 64)	34 oz.
H20/Cement Ratio	0.40
Slump	4 +/- 1″
Unit weight	119 pcf

Table 1

Component	Load (kips)
Lifting Truss	108
Self Propelled Modular Trailers	212
Old Deck Panel	192
New Deck Panel	184
Hydraulic Equipment Hoists and Miscellaneous	4
Total	**700**

Table 2

Conclusions: The precast concrete deck panel system showed that rapid replacement of the deck in truss bridges and widening of the deck in the rolled beam spans is possible, without closing down the bridge for more than 8 hours at night. The impact to the businesses community and the general public was minimal when considering the magnitude of the project. It may be appropriate to use this concept for rehabilitation of other truss bridges subjected to similar traffic and time constraints. The bridge deck will be monitored to gauge its durability. Total cost for the project was $27 million.

Acknowledgements: The author is grateful to Joe Merth, Patrick Clarke, and Munindra Talukdar who were the key designers of these projects, and helped write this paper.

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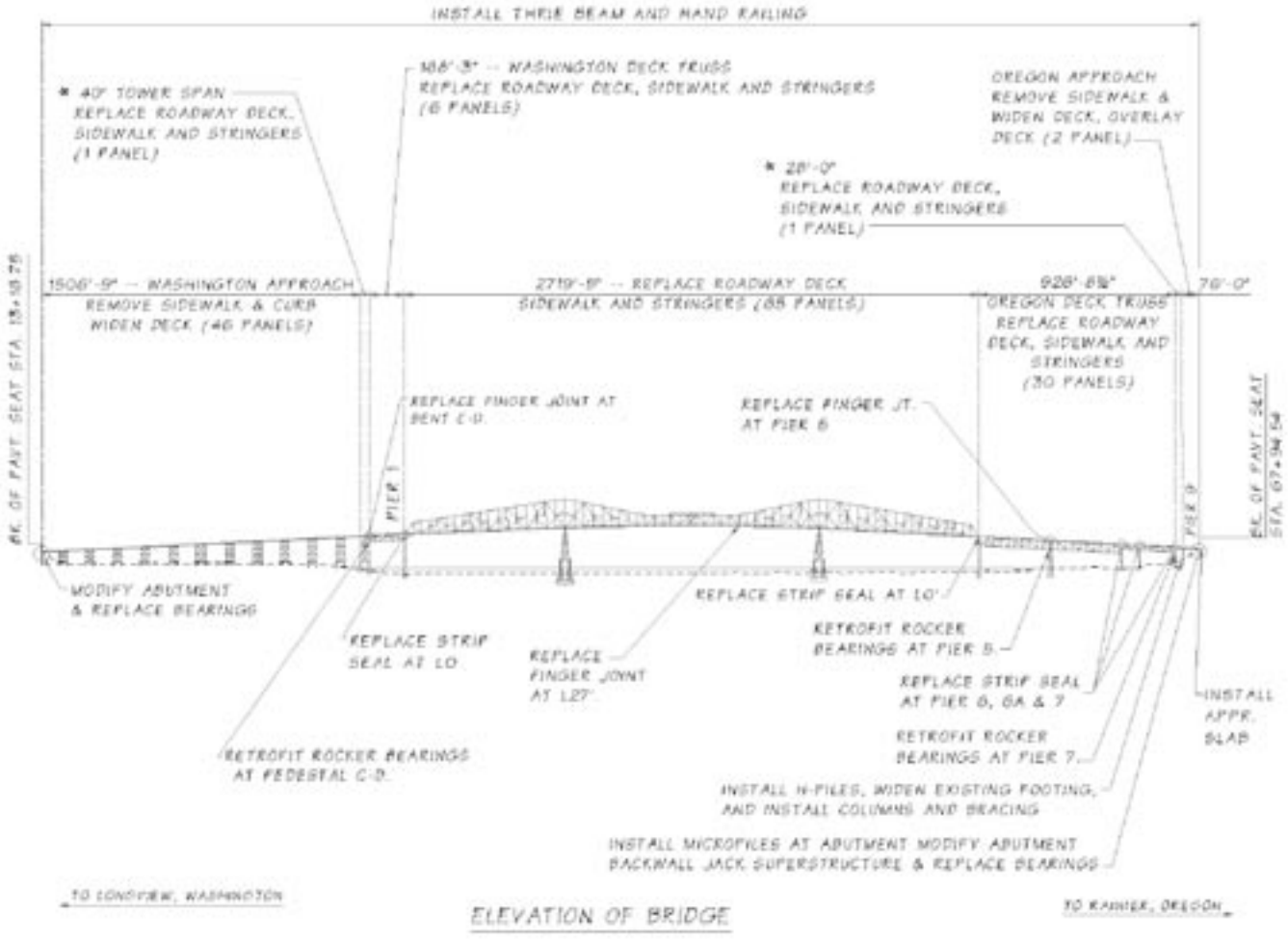
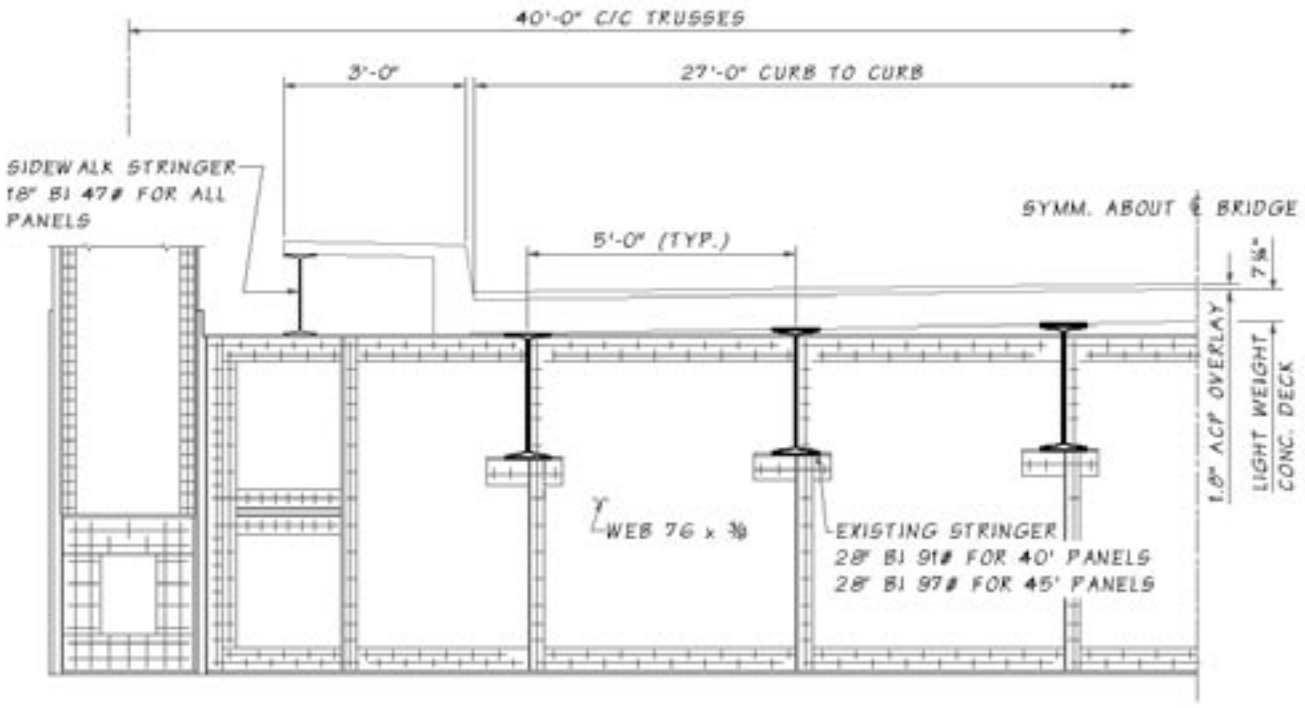
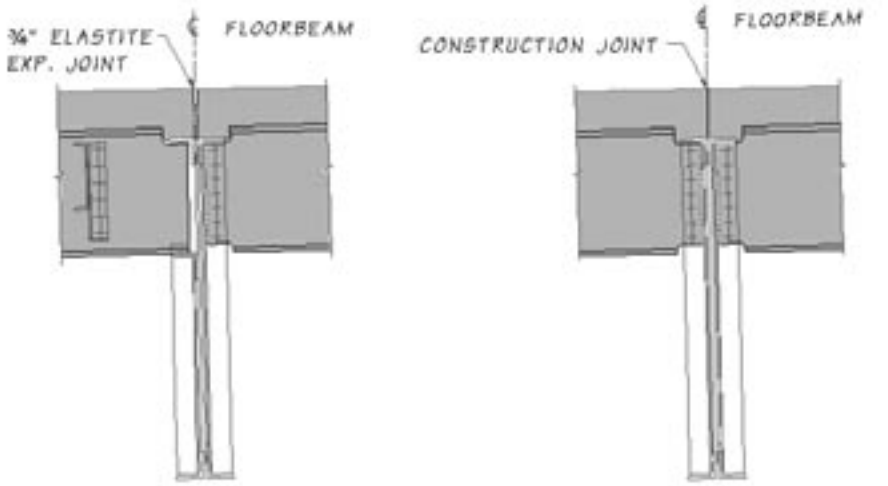


Figure 1



ELEVATION - EXISTING FLOORBEAM & DECK



EXPANSION - FIXED

FIXED - FIXED

SECTIONS - EXISTING STRINGER
TO FLOORBEAM CONNECTIONS

REMOVE SHADED PORTION AT TIME OF DECK REMOVAL

Figure 2

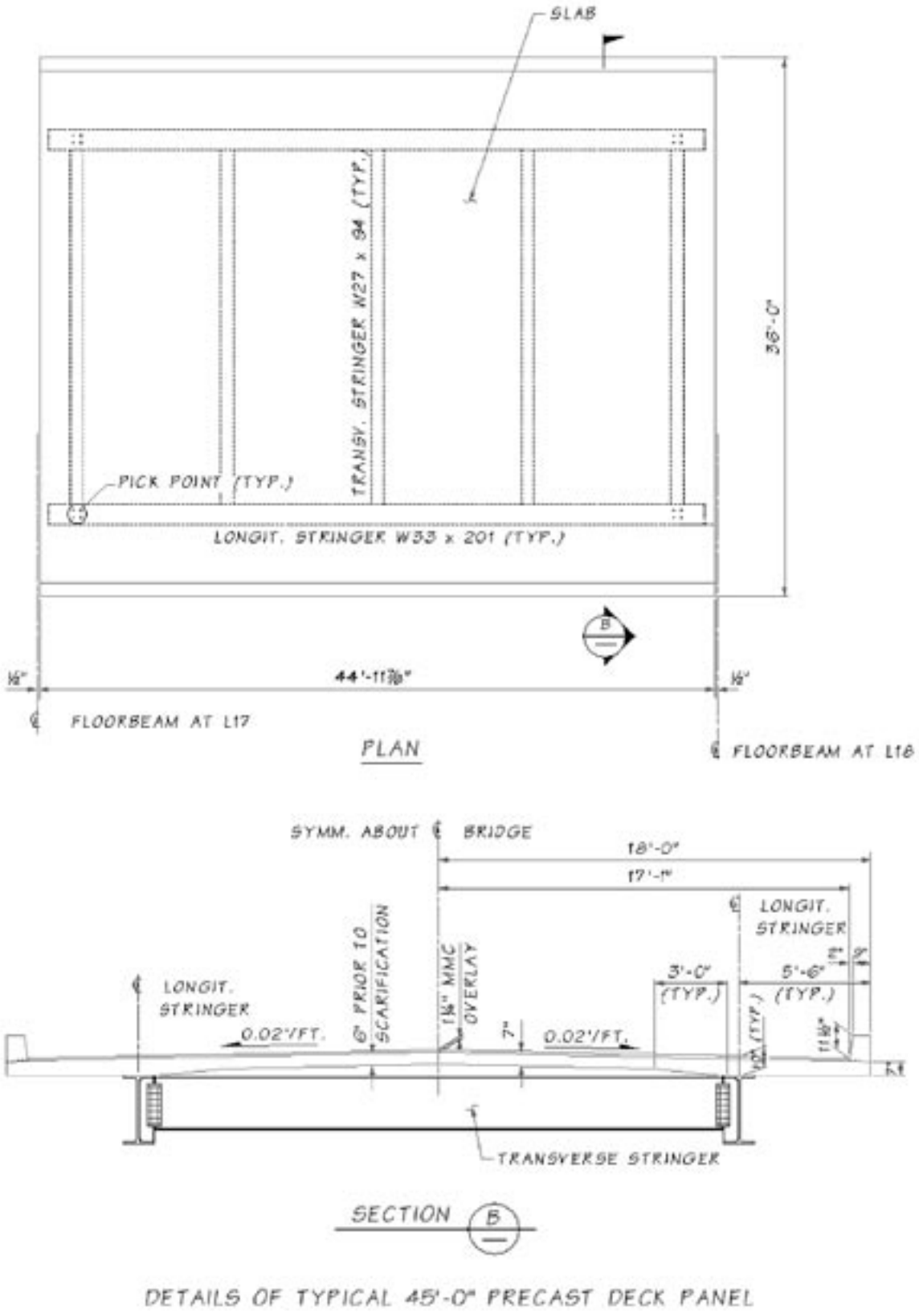
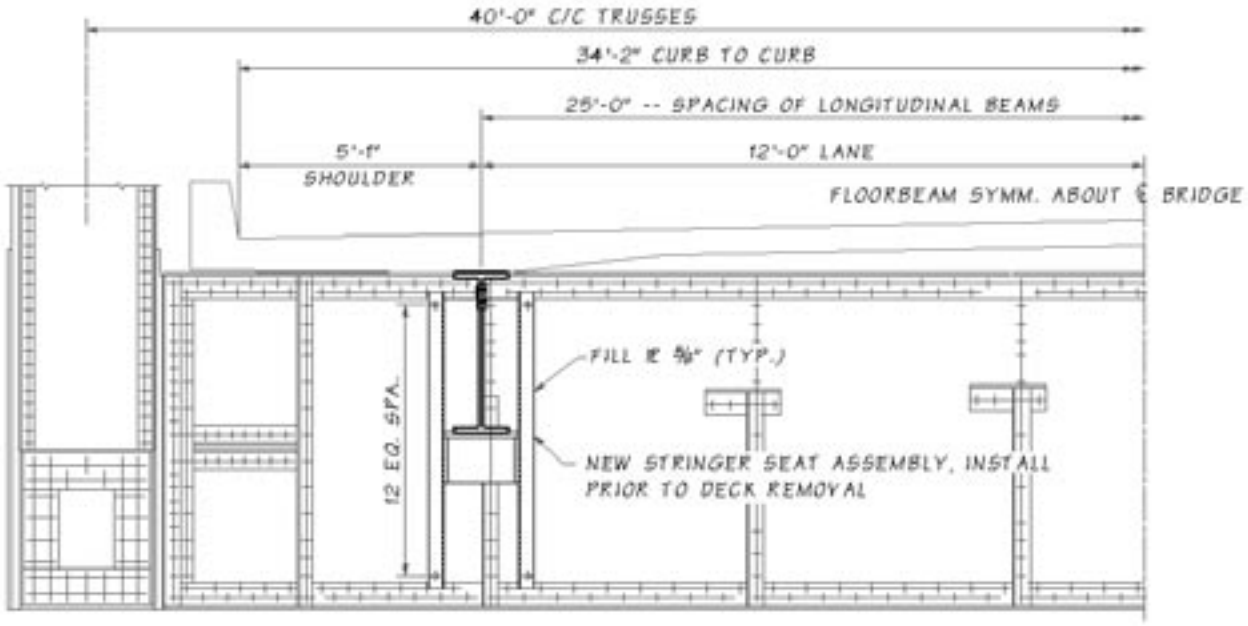
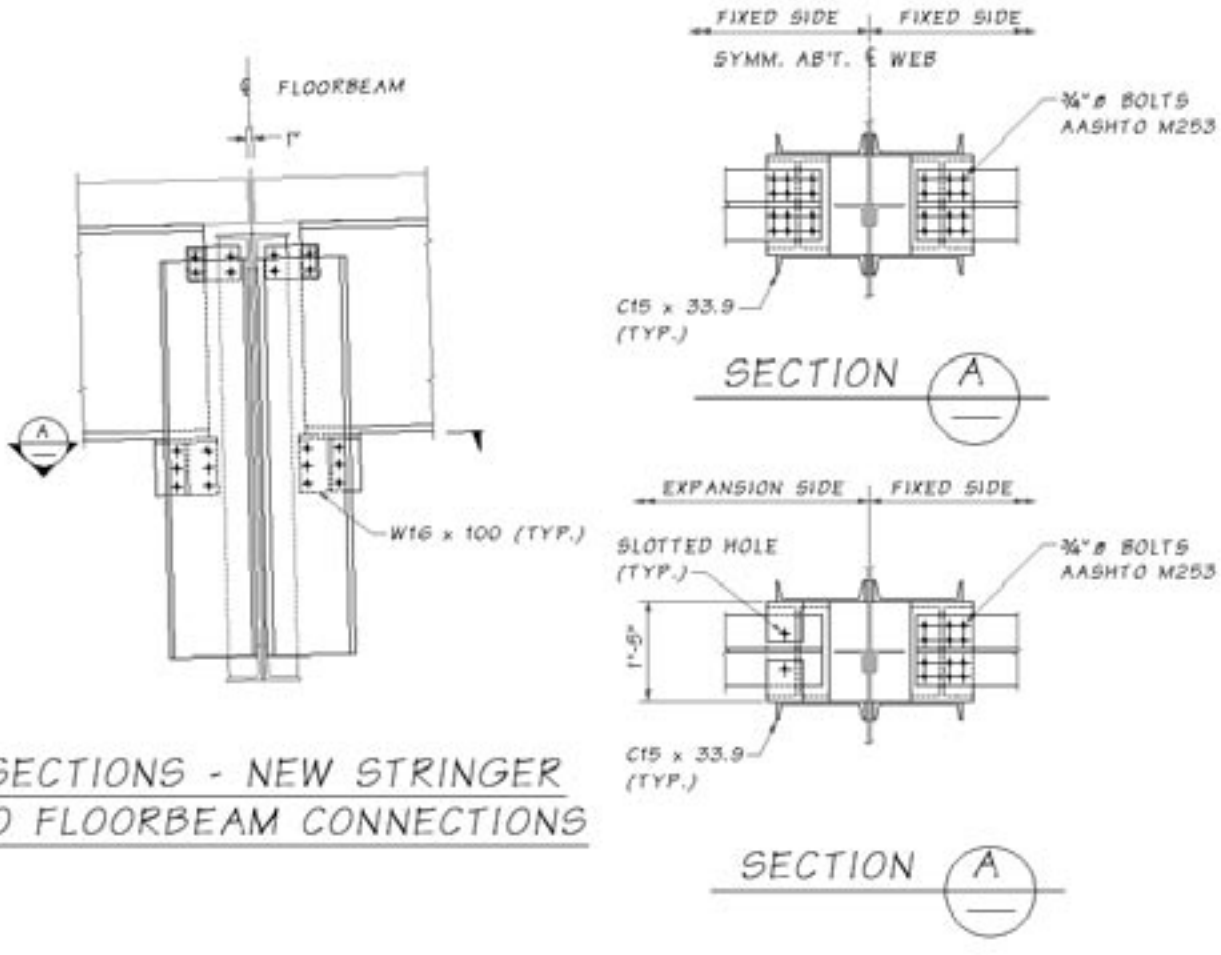

SLAB
TRANSV. STRINGER W27 x 94 (TYP.)
36'-0"
PICK POINT (TYP.)
LONGIT. STRINGER W33 x 201 (TYP.)
B
½"
44'-11⅜"
½"
℄ FLOORBEAM AT L17
℄ FLOORBEAM AT L18
PLAN
SYMM. ABOUT ℄ BRIDGE
18'-0"
17'-1"
LONGIT. STRINGER
LONGIT. STRINGER
6" PRIOR TO SCARIFICATION
1¼" MMC OVERLAY
7"
0.02'/FT.
0.02'/FT.
3'-0" (TYP.)
5'-6" (TYP.)
TRANSVERSE STRINGER
SECTION B
DETAILS OF TYPICAL 45'-0" PRECAST DECK PANEL

Figure 3



ELEVATION - MODIFIED FLOORBEAM & NEW DECK



SECTIONS - NEW STRINGER TO FLOORBEAM CONNECTIONS

Figure 4

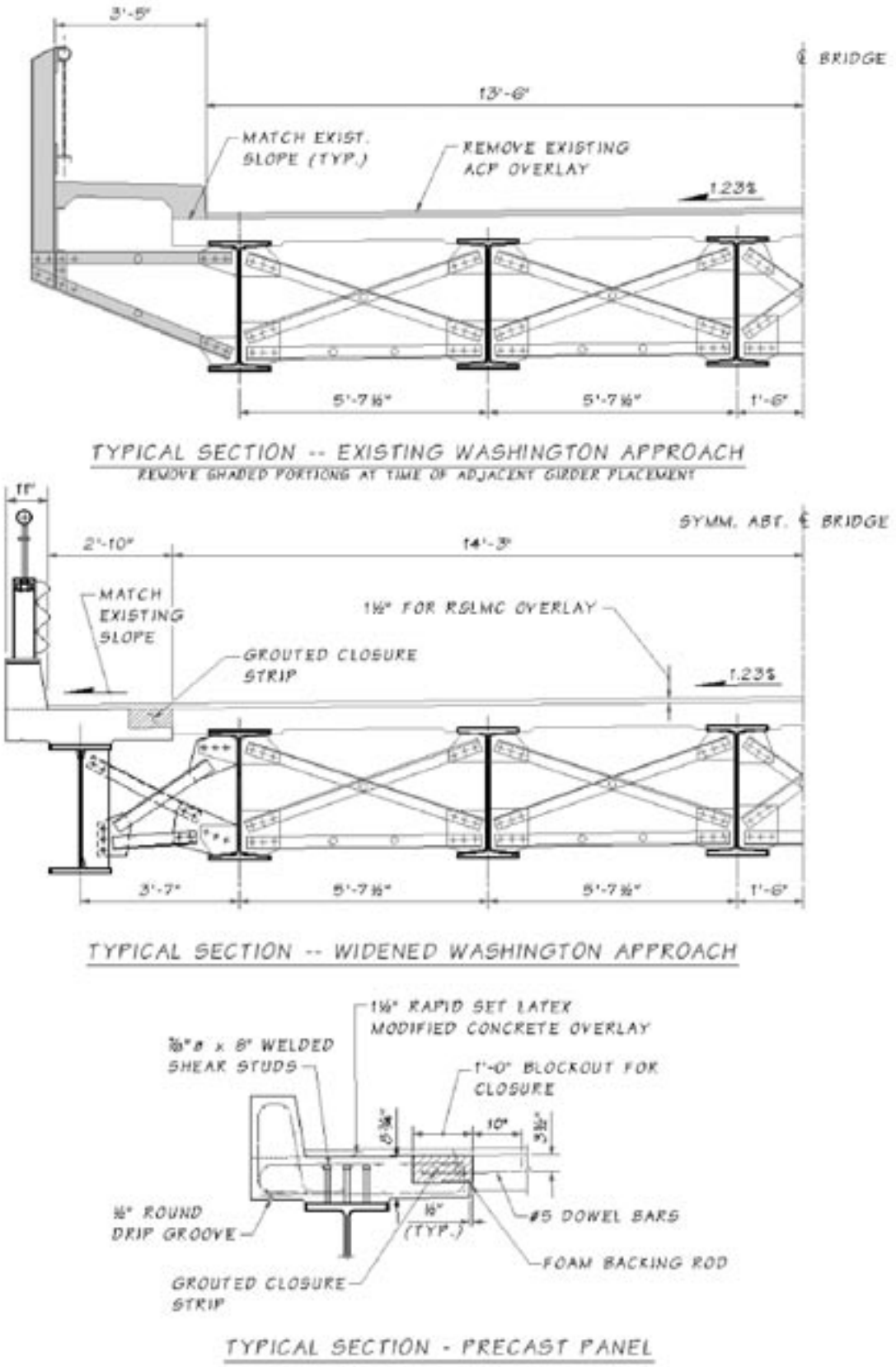

3'-5"
℄ BRIDGE
13'-6"
MATCH EXIST. SLOPE (TYP.)
REMOVE EXISTING ACP OVERLAY
1.23%
5'-7½"
5'-7½"
1'-6"
TYPICAL SECTION -- EXISTING WASHINGTON APPROACH
REMOVE SHADED PORTIONS AT TIME OF ADJACENT GIRDER PLACEMENT
11"
SYMM. ABT. ℄ BRIDGE
2'-10"
14'-3"
MATCH EXISTING SLOPE
1½" FOR RSLMC OVERLAY
GROUTED CLOSURE STRIP
1.23%
3'-7"
5'-7½"
5'-7½"
1'-6"
TYPICAL SECTION -- WIDENED WASHINGTON APPROACH
1½" RAPID SET LATEX MODIFIED CONCRETE OVERLAY
⅞"ø x 8" WELDED SHEAR STUDS
1'-0" BLOCKOUT FOR CLOSURE
10"
#5 DOWEL BARS
½" ROUND DRIP GROOVE
(TYP.)
FOAM BACKING ROD
GROUTED CLOSURE STRIP
TYPICAL SECTION - PRECAST PANEL

Figure 5

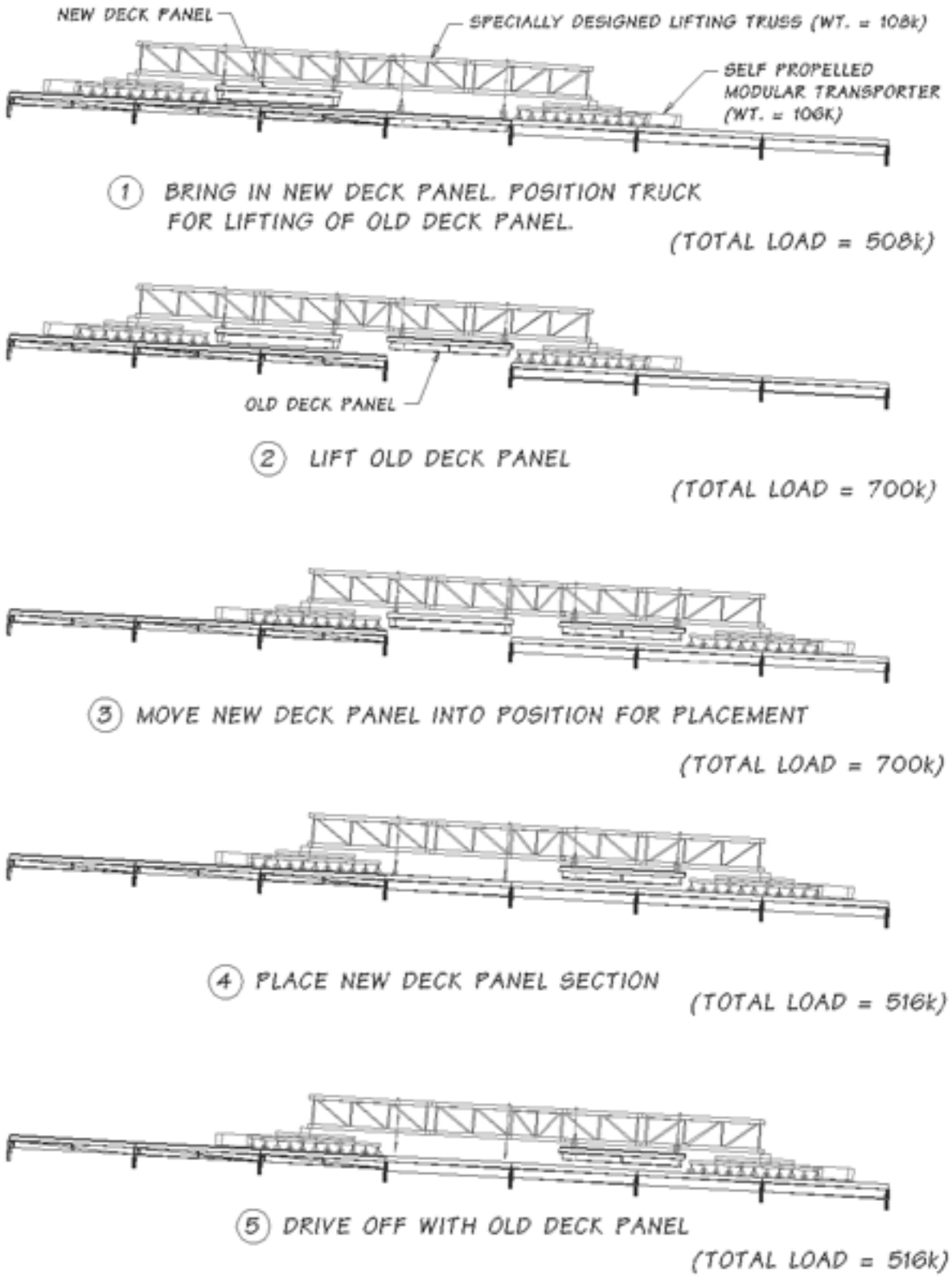

NEW DECK PANEL
SPECIALLY DESIGNED LIFTING TRUSS (WT. = 108k)
SELF PROPELLED MODULAR TRANSPORTER (WT. = 106K)
1 BRING IN NEW DECK PANEL. POSITION TRUCK FOR LIFTING OF OLD DECK PANEL.
(TOTAL LOAD = 508k)
OLD DECK PANEL
2 LIFT OLD DECK PANEL
(TOTAL LOAD = 700k)
3 MOVE NEW DECK PANEL INTO POSITION FOR PLACEMENT
(TOTAL LOAD = 700k)
4 PLACE NEW DECK PANEL SECTION
(TOTAL LOAD = 516k)
5 DRIVE OFF WITH OLD DECK PANEL
(TOTAL LOAD = 516k)
DECK PLACEMENT SEQUENCE

Figure 6

Figure 7

WST2 Resources

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- ❑ Data Integration Primer, FHWA, 2001
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- ❑ Dust Control on Low Volume Roads, FHWA, 2001
- ❑ Dust Palliative Selection and Application Guide, USDA, 1999
- ❑ Entering the Quiet Zone, FHWA, 2002
- ❑ Everyone is a Pedestrian, FHWA, 2001
- ❑ Fish Passage Through Culverts, FHWA, USDA, 1998
- ❑ General Field Reference Guide (Pocket Size), 2002
- ❑ Gravel Roads Maintenance and Design Manual, South Dakota LTAP, 2000
- ❑ Highway Design Handbook for Older Drivers and Pedestrians, FHWA, 2001
- ❑ Highway Finance and Public-Private Partnerships – New Approaches to Delivering Transportation Services, FHWA, 2005
- ❑ HMA Pavement Smoothness, FHWA, 2002
- ❑ Improving Conditions for Bicycling and Walking, FHWA, 1998
- ❑ Improving Highway Safety at Bridges on Local Roads and Streets, FHWA, 1998
- ❑ Increasing Physical Activity Through Community Design, 2002
- ❑ Intelligent Transportation systems in Work Zones: 3 Case Studies – Real Time Work Zone Traffic Control System; Work Zone Travel Time System; and Dynamic Lane Merge System, FHWA, October 2004
- ❑ Maintenance of Aggregate and Earth Roads, WST2 Center (1994 reprint)
- ❑ Pavement Markings, FHWA, 2002
- ❑ Pavement Preservation Checklists, FHWA, six pocket guides:
  1. Crack Seal Application
  2. Chip Seal Application
  3. Thin Hot-Mix Asphalt Overlay
  4. Fog Seal Application
  5. Microsurfacing Application
  6. Joint Sealing Portland Cement Concrete Pavements
- ❑ Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA and WSDOT, 1999
- ❑ Pedestrian Safety for the Older Adult (65+), NHTSA
- ❑ Portable Changeable Message Sign Handbook (PCMS) FHWA, 2003
- ❑ Prefabricated Bridges 2004: Good Business-Best Practice, AASHTO TIG/FHWA
- ❑ PCC Pavement Smoothness, FHWA, 2002
- ❑ Reflective Sheeting Identification Guide, FHWA, 2001
- ❑ Road Sign Symbols, FHWA, 2002
- ❑ Roadway Safety Tools for Local Agencies, NCHRP, Synthesis 321, TRB, 2003
- ❑ Scenic Byways Map of Washington State, 2003
- ❑ School Administrator's Guide to School/Walk Routes and Pedestrian Safety, WTSC, 2003
- ❑ Traffic Control Handbook for Mobile Operations at Night, FHWA, 2003
- ❑ Trail Construction and Maintenance Notebook, USDA Forest Service, 2004
- ❑ A Walkable Community is More Than Just Sidewalks Brochure, FHWA, 2000
- ❑ Washington Bicycle Map, WSDOT, 2001
- ❑ Wildlife Habitat Connectivity Across European Highways, FHWA, 2002
- ❑ Work Zone Traffic Control Guidelines, WSDOT, 2005

Workbooks and Handouts from WST2 Center Workshops

- ❑ Construction Documentation: Construction Training Manual for Local Agencies, WSDOT, 2005
- ❑ Context Sensitive Solutions in Washington, WSDOT and CH_2M Hill, 2004
- ❑ Implementing HMA (Superpave) in Local Agencies, WSDOT & FHWA, 2005

Free Videotapes

- ❑ Danger Signs, 2004
- ❑ Driving Modern Roundabouts, City of Lacey, City of Olympia, and WSDOT, 2002
- ❑ Modern Roundabouts: Tomorrow's Solution for Today's Traffic, City of Bellingham, 2005
- ❑ Pacific Northwest Transportation Technology Expo and Mousetraps
- ❑ Preventive Maintenance Project Selection: Right Road, Right Treatment, Right Time, FHWA, 2003

Free CD ROM

- ❑ H&LP CD Library, 7th Edition, Summer 2005 contains the following publications and many other technical documents:
  - Asphalt Pavement Repair Manuals of Practice, SHRP, 1993
  - Asphalt Seal Coats, WSDOT/ WST2 Revised 2003
  - Building Projects that Build Communities, Community Partnership Forum, 2003
  - Erosion Control Handbook for Local Roads, 2003
  - Gravel Roads Maintenance and Design Manual, South Dakota LTAP, November 2000
  - Highway Runoff Manual, 2004
  - Local Agency Guidelines, APR 2005
  - Local Agency Pavement Management Application Guide, WST2 Center, 1997
  - Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA, WSDOT, 1999
  - Pedestrian Facilities Guidebook
  - Roundabouts: An Information Guide, FHWA, 2000
  - School Administrator's Guide to School Walk Routes and Student Pedestrian Safety, 2003
  - Streetwise Automated Basic Pavement Management System, WSDOT, 2001
  - Superpave Mixture Design Guide, 2001
  - Superpave Performance and Cost Comparison, 2004

Other CDs

- ❑ Bicycle Safer Journey, FHWA, 2003
- ❑ Building Projects that Build Communities, WSDOT, 2003
- ❑ Comprehensive Intersection Resource Library
- ❑ Driver Education Work Zone Awareness Program, ATSSA
- ❑ Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- ❑ Emergency Relief Training for Washington State Local Agencies, WSDOT, 2004
- ❑ Endangered Species Act – Build Smart, 2 CD set, FHWA, 2004
- ❑ HRC-BAC: High Performance Concrete Structural Designer's Guide, 2005
- ❑ Inspection of Ground Anchors, FHWA, 2005
- ❑ Introduction to the Inspection of Ground anchors and Soil Nails, FHWA, 2005
- ❑ Lightly on the Land, FHWA, 2004
- ❑ Pavement Preservation Toolbox, 2005
- ❑ Pavement Preservation 2, 2003
- ❑ Road Risk, FHWA and the Weather Channel, 2005
- ❑ School Administrator's Guide to School/Walk Routes and Student Pedestrian Safety, WTSC, 2004
- ❑ Work Zone Safety for Roadway Maintenance Operations, Interactive Training Course Advanced Technology Concepts With Rutgers University
- ❑ WSDOT Engineering Publications CD Library, March 2005

Free DVD

- ❑ Danger Signs, 2004
- ❑ Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- ❑ Pedestrian Safety, City of Olympia and Washington Traffic Safety Commission, 2004
- ❑ Prefabricated Bridge Elements and Systems, AASHTO, 2005

Self-Study Guides

These non-credit WSDOT self-study guides may be obtained from the WST2 Center. An invoice will be sent with the books.

Basic Surveying, $20
Advanced Surveying (metric), $20
Contract Plans Reading, $25
Technical Mathematics l, $20
Technical Mathematics ll, $20
Basic Metric System, $20

New Videos in Video Lending Library!

The WST2 Center has added videos to our lending library. Here is a list of the new additions. Agencies inside Washington State may check one out. Give us a call at (360) 705-7386.

- ❑ 474 **Winter Driving School at Steamboat.** 30 min. Why skid on compact snow and ice? Learn how to control your automobile: vehicle dynamics in snow; traction, the effects of under steering and over steering, correct braking, and understanding vehicle trajectory around curves on ice.
- ❑ 475 **Office and Computer Ergonomics.** 13 min. This video shows how to develop an ergonomics program in an office environment, particularly computers, desk set-up, and general office ergonomics.
- ❑ 476 **Confined Space Safety/ Manhole Entry.** 45 min. This video presents an informative look at the hazards and procedures involved with manhole confined space operations: site testing, safety, and traffic control. Ends with an accident re-enactment.
- ❑ 477 **Hazard Communications: The New Millennium.** 26.37 min. Information provides compliance

for 1910.1200 written and training requirements. Addresses hazardous materials, written HazCom plan & requirements, hazard classification system, routes of entry, MSDS, proper labeling & storage.

❑ 478 **Lock-Out/Tag-Out Training for Affected and Authorized Employees.** 15:49 min. Covers 1910.147 and helps ensure employees are following safe work practices. Shows proper Lock-out & Tag-out steps to take and tags to place.

❑ 479 **Safe Operation of Cranes and Hoists.** 12 min. This comprehensive training program is designed for companies that use indoor cranes & jib hoists. Safety information covers inspection parameters, load ratings and proper sling angles.

❑ 480 **Overexertion: Injury Prevention.** 15 min. Employees learn how the body functions, risk factors associated with overexertion type injuries, and preventive measures. Motivates employees to make adjustments to ensure health and safety.

❑ 481 **Hearing Conservation: What Do You Want to Hear?** 15:50 min. This video shows how an organization can create an awareness and respect for noise hazards and by motivating employees to protect their hearing. How the ear works, why exposure to loud noises affects hearing permanently, correct use of hearing protection, best safety practices.

❑ 482 **Keller's Extreme 7 Minute Training: Rain!** Water on the road has four major effects on your ability to drive: Limited Visibility, Loss of Traction, Hydroplaning, and the possibility of Mechanical Breakdown. Reduce speed to compensate for poor weather conditions, and if you can't see, get completely off the road!

❑ 483 **High Impact Power Tool Safety.** 19 min. Six accidents with power tools are re-enacted to show the importance of "Thinking Safety" in every task. Real world advice on using tools safely. Inspect before use, select the proper tool for the job, proper positioning of the tool and your body, hazards of electric extension cords.

❑ 484 **Road Rage Driver Training.** 27:15 min. The #1 concern of vehicle drivers today is Road Rage. Presented as a training tool to professional truck drivers, this video attributes Road Rage to aggressive driving, resulting from increased congestion, reduced enforcement (budget cuts) and societal pressures stressing drivers.

❑ 485 **Basic Electrical Safety in the Workplace – Spanish Version.** 11 min. Covers dangers of electricity: Static electricity and high voltage wires; shock prevention: inspection, ground wiring, double insulation, no cheater plugs, care around liquids; cord safety: tripping and wear hazards, inspection, match cord to equipment being used, fire and explosion hazards.

❑ 486 E**mployee Safety Orientation (Orientation 2000) Short Version – Spanish Version.** 11 min. Meet OSHA requirements for training in general hazards regarding proper clothing, machine guarding, accident reporting and more. This video may be used for new employee orientation and as a refresher for more experienced employees.

❑ 487 **Hazard Communication – Right-to-Know – Spanish Version.** 10 min. This video aids in compliance with retraining requirements of OSHA 1910.1200. Encourage employees to use HazCom information. Covers hazardous material definition and OSHA Safety Standards, Labels and following directions, MSDS section-by-section info., labeling new containers.

❑ 488 **MSDS and Hazard Communications.** 18 min. Describes material safety data sheets (MSDS), labeling requirements, basic safety when using hazardous chemicals/ materials, and more.

❑ 489 **OSHA Log 300 Recordkeeping and Insurance.** 12 min. Designed for administrative persons responsible for safety and insurance related reports. This video explains accident investigation, proper completion of records, and procedure for hospital or clinic visits and follow-up paperwork. For administrative personnel, supervisors, and safety officers.

❑ 490 **Top 10 OSHA Violations amd How to Eliminate Them.** 15 min. OSHA Standards address physical hazards. Employers must have a written safety Program and document safety training. Most frequent violations include: Respiratory Protection, Lockout/ Tagout, Electrical Wiring, Machine Guarding, Powered Industrial Truck, Electrical Systems, and others.

❑ 491 **Safety in the Maintenance Department – Part 1.** 10 min. Maintenance personnel are relied upon to keep things moving. They must practice safety at all times: wear personal protective equipment, practice safe use of hand and power tools, using only if in safe, serviceable condition, making sure electrical tools have ground wire, discard broken tools.

❑ 492 **Safety in the Maintenance Department – Part 2.** 16 min. Covers Lockout/Tagout, confined spaces, fire protection, proper storage of flammables, how to operate a fire extinguisher, proper use of step and straight ladders, compressors, "Right to Know" MSDS for hazardous chemicals must be readily accessible; labels, labeling identify hazardous items.

❑ 493 **Motor Fleet Maintenance Safety.** 17 min. Meets OSHA requirements for mechanic safety training. Addresses hazards associated with vehicle maintenance and repair. Wear proper boots and clothing, wear correct personal protective equipment. Explains basic tools, electrical hand tools, hydraulics, fire hazards, and more.

❑ 494 **Carpal Tunnel Syndrome.** 12 min. Carpal Tunnel Syndrome (CTS) is discussed in this safety video as well as how to prevent it, and what employees can do to reduce its effects.

❑ 495 **Cyber Crime & Privacy.** 17 min. There are many legal cyber issues other than hacking. This video covers the different laws and Federal Acts that deal with economic espionage, copyright infringement, computer security, and privacy issues. Viruses and pornography are also addressed.

❑ 496 **Peer Today, Boss Tomorrow: Navigating Your Changing Role.** 25 min. Changing from peer to boss is not easy. New managers frequently struggle to balance old co-worker relationships with new management responsibilities. This video presents

proven strategies that will help new supervisors with changing relationships and prepare for difficult situations.

❑ 497 **Recognizing Drug and Alcohol Abuse (for Employees).** 18 min. This program covers the basics for any employee for training on the dangers of alcohol and controlled substance abuse, and the potential consequences of their misuse. Drivers must be trained on this subject, according to the USDOT's Alcohol & Testing Rule.

❑ 498 **Heat Stress: Don't Lose Your Cool – Safety 101.** 14 min. This program provides a no-nonsense approach to heat stress and how to prevent or treat heat disorders. Addresses: sunburn, acclimatization, heat rash, heat exhaustion, heat stroke, fluid intake and foods to eat under hot conditions, correct clothing to wear in hot environments.

❑ 499 **Sexual Harassment in the Workplace: It's Not Enough to Know Better.** 25 min. An organization can protect itself from legal liability by having and communicating appropriate sexual harassment policies and procedures, and holding annual training sessions on sexual harassment, but this is not enough. Persons with authority over others are held to a higher standard. Leader's Guide.

❑ 500 **Forklift Operator Safety Training.** 26 min. Train forklift operators and meet OSHA's "formal instruction" training requirements (29CFR Section 1910.178(I). Video covers 6 safety topics critical to avoiding accidents and injuries: general safety, pre-operation, operation, load handling, fuel-battery maintenance, and specialized units.

System Requirements for the following CD items: 486/100 MHz (minimum), CD-ROM, 8 MB RAM, Sound Card. Available Hard Disk Space 3 MB. Windows 95, 98, NT 4.0, 2000, or Windows XP.

Learn valuable word processing skills in Microsoft Word with these step-by-step tutorials on CD ROM.

❑ 501 **Microsoft Word 2000 Beginner Office 2000 Professional.**

❑ 502 **Microsoft Word 2000 Intermediate Office 2000 Professional.**

❑ 503 **Microsoft Word 2000 Advanced Office 2000 Professional.**

Learn valuable spreadsheet skills in Microsoft Excel with these step-by-step tutorials on CD ROM.

❑ 504 **Microsoft Excel 2000 Beginning Office 2000 Professional.**

❑ 505 **Microsoft Excel 2000 Intermediate Office 2000 Professional.**

❑ 506 **Microsoft Excel 2000 Advanced Office 2000 Professional.**

Learn valuable database skills in Microsoft Access with these step-by-step tutorials on CD ROM.

❑ 507 **Microsoft Access 2000 Beginning Office 2000 Professional.**

❑ 508 **Microsoft Access 2000 Intermediate Office 2000 Professional.**

❑ 509 **Microsoft Access 2000 Advanced Office 2000 Professional.**

Learn valuable presentation skills in Microsoft PowerPoint with these step-by-step tutorials on CD ROM.

❑ 510 **Microsoft PowerPoint 2000 Beginner Office 2000 Professional.**

❑ 511 **Microsoft PowerPoint 2000 Intermediate Office 2000 Professional.**

❑ 512 **Microsoft PowerPoint 2000 Advanced Office 2000 Professional.**

Learn valuable communication skills in Microsoft Outlook with these step-by-step tutorials on CD ROM.

❑ 513 **Microsoft Outlook 2000 Beginner Office 2000 Professional.**

❑ 514 **Microsoft Outlook 2000 Intermediate Office 2000 Professional.**

❑ 515 **Microsoft Outlook 2000 Advanced Office 2000 Professional.**

On-line Resources

Bridge

- WSDOT Highways & Local Programs
  http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM

Environmental

- *Environmental Procedures Manual* (M31-11)
  http://www.wsdot.wa.gov/fasc/EngineeringPublications/Manuals/EPM/EPM.htm
- Regional Road Maintenance Endangered Species Act Program Guidelines
  http://www.metrokc.gov/roadcon/bmp/pdfguide.htm
- National Marine Fisheries Service Species Listings & Info
  http://www.nwr.noaa.gov/
- U.S. Fish and Wildlife Service Species Listings & Info
  http://endangered.fws.gov/
- Washington State DNR's Natural Heritage Program Home Page
  http://www.wa.gov/dnr/htdocs/fr/nhp/refdesk/fsrefix.htm
- FHWA's Environmental Home Page
  http://www.fhwa.dot.gov/environment/index.htm

Highways & Local Programs List Servs

For the following list servs:

- WST2 Newsletter
- WST2 Training
- Traffic Technology and Safety

Use the following address to sign up:

http://www.wsdot.wa.gov/TA/T2Center/T2hp.htm

WSDOT Materials Lab

- http://www.wsdot.wa.gov/biz/mats

Infrastructure Management & GIS/GPS

The site below has been established to promote interagency data exchange and resources sharing between local governmental agencies.

http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/InfrastructureTechnology/InfaThp.html

Legal Search

- Search RCWs and WACs
  http://search.leg.wa.gov/pub/textsearch/default.asp

Local Agency Guidelines (LAG) Manual

- http://www.wsdot.wa.gov/TA/Operations/LAG/LAGHP.htm

Pavement Management

- Pavement Publications & NWPMA Links
  http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology
- NWPMA – North West Pavement Management Association
  http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology/nwpma.html
- Asphalt Institute
  http://www.asphaltinstitute.org/
- National Asphalt Pavement Association
  http://www.hotmix.org/
- Pavement (A Website for Managing Pavements)
  http://www.mincad.com.au/pavenet
- SuperPave Information
  http://www.utexas.edu/research/superpave

Project Development

- Federal Aid Progress Billing Form
  http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORM.XLS
- State Funded Progress Billing Form
  http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORMSTATE.xls
- STIP (State Transportation Improvement Program)
  http://www.wsdot.wa.gov/TA/ProgMgt/STIP/STIPHP.htm
- TIP (Local Agency 6-Year Transportation Improvement Program)
  http://www.wsdot.wa.gov/TA/ProgMgt/STIP/TIP.html

Research

- WSDOT Research Office
  http://www.wsdot.wa.gov/research
- Looking for a Transportation Research Publication?
  http://gulliver.trb.org
- Municipal Research and Services Center of Washington
  http://www.mrsc.org

Traffic & Safety

- Safety Management Publications & Information
  http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/SafetyTechnology/
- WSDOT Traffic Data Office
  http://www.wsdot.wa.gov/mapsdata/tdo/
- Washington State Patrol
  http://www.wsp.wa.gov
- Washington Traffic Safety Commission
  http://www.wtsc.wa.gov
- National Highway Traffic Safety Administration
  http://www.nhtsa.dot.gov
- American Traffic Safety Services Association
  http://www.atssa.com
- Municipal Research and Services Center of Washington
  http://www.mrsc.org
- Transportation Research Board
  http://gulliver.trb.org

Training

- WST2 Classes
  http://www.wsdot.wa.gov/TA/T2Center/Training/
- WST2 Class Registration
  http://fmapps.wsdot.wa.gov/tbase_registration/
- County Road Administration Board
  http://www.crab.wa.gov/
- American Public Works Association
  http://www.apwa.net/education
- Transportation Partnership in Engineering Education Development (TRANSPEED)
  http://www.engr.washington.edu/epp

WSDOT Local Programs Engineers

- Eastern Region (Spokane)
  Keith Martin, (509) 324-6080,
  martink@wsdot.wa.gov
- Northwest Region (Seattle)
  Ed Conyers, (206) 440-4734,
  conyere@wsdot.wa.gov
- Olympic Region (Olympia)
  Neal Campbell, (360) 357-2666,
  campben@wsdot.wa.gov
- North Central Region (Wenatchee)
  Paul Mahre, (509) 667-3090 or 667-2900,
  mahrep@wsdot.wa.gov
- South Central Region (Yakima)
  Roger Arms, (509) 577-1780,
  armsr@wsdot.wa.gov
- Southwest Region (Vancouver)
  Bill Pierce, (360) 905-2215,
  pierceb@wsdot.wa.gov

Other On-line Resources

- Bicycle maps and other information
  http://www.wsdot.wa.gov/bike/
- Pedestrian information
  http://www.wsdot.wa.gov/walk/
- Rural Partnerships and scenic byways information
  http://www.wsdot.wa.gov/TA/progmgt/byways/
- Better Mousetraps
  http://www.wsdot.wa.gov/ta/T2Center/Mousetraps/
- Retired Professional Program
  http://www.wsdot.wa.gov/TA/T2Center/Retired.htm
- Student Referral Program
  http://www.wsdot.wa.gov/TA/T2Center/StudentReferral/
- LTAP (Local Technical Assistance Program) Clearing House
  http://www.ltapt2.org
- Institute of Transportation Engineers
  http://www.ite.org
- Washington State Counties
  http://mrsc.org.byndmrsc/counties.aspx
- Washington State Cities and Towns
  http://mrsc.org.byndmrsc/cities.aspx
- Governor's Office of Indian Affairs
  http://www.goia.wa.gov
- Southwest Interagency Coop - Grounds Equipment Maintenance (GEM)
  http://www.gematwork.org

Training Opportunities

Washington State T2 Center

Contact: Laurel Gray (360) 705-7355
Wendy Schmidt (360) 705-7386
http://www.wsdot.wa.gov/TA/T2Center/Training

To register for a class in this section, use the contacts listed above.

The class fees shown apply to both public and private sector students. Updated information on these courses, and a link to the on-line registration form, can be obtained from the web page listed above.

Basics of a Good Gravel Road

2006: May 2, Kennewick. $45. Instructor: Bill Heiden. This class is for anyone who has responsibility for design and/or maintenance of gravel roads and streets. The class will discuss engineering basics, good surface materials, dust palliatives/base stabilizers, equipment and methods to maintain a good gravel road, and sequences and specifications.

Bridge Condition Inspection Update (BCIU)

2006: February 1-2, Moses Lake; February 15-16, Lacey. **Free.** Instructor: Grant Griffin, WSDOT Bridge Engineer. This course will provide information on the latest inspection manual, Laptop98 bridge inspection software, bridge file records, and other important bridge inspection issues. Sufficiency ratings and proper coding of bridge elements will also be discussed.

Bridge Condition Inspection Fundamentals (BCIF)

2006: February 7-9, Lacey. **Free** to Washington State local agencies and consultants. All others **$150**. Instructor: Grant Griffin, WSDOT Bridge Engineer. This course is designed to provide basic knowledge of bridge condition inspection, construction materials, material properties, bridge components and nomenclatures, loadings, stresses and strains, and deterioration of bridge materials and members. This course is preparatory for Bridge Condition Inspection Training. Graduate engineers or engineering technicians with bridge experience need not attend.

Bridge Condition Inspection Training (BCIT)

2006: March 13-24, Lacey. **Free** to Washington State local agencies and consultants. All others **$700**. Instructor: WSDOT Bridge, Highways and Local Programs,Hydraulics, and FHWA. This training is for new bridge inspectors or those who desire a refresher. It is based on the FHWA "Bridge Inspector's Reference Manual" and will provide extensive training on the condition inspection of in-service bridges. Two comprehensive examinations will be administered: a field exam covering inspection and inventory coding, and a multiple choice classroom exam. Satisfactory completion of this course will fulfill the training requirements of the National Bridge Inspection Standards (NBIS) for a "comprehensive training course" based on the reference manual.

Construction Documentation

2005: December 13, Shoreline; December 14, Kent.

2006: January 10, Port Orchard; January 11, Tacoma; January 30, Vancouver; February 1, Tumwater; February 14, Wenatchee; February 16, Kennewick; March 14, Burlington; March 15, Bellevue. **Free.** Instructor: Ken Hash, WSDOT SW Region Engineer. Regional Local Program Engineers will be in attendance at each class to answer questions. This course covers three project phases: pre-contract, contract, and post-contract documentation of public works projects with FHWA funding. Local agency and contractor's documentation is discussed, with a strong emphasis on the documentation requirements of the field inspector. On completion of this course, participants will have a working knowledge of: (1) required documentation that will be submitted by the contractor, (2) required documentation for acceptance of contract materials, (3) daily inspector's documentation of the contract work, and (4) source documentation for the monthly progress payment to the contractor.

Context Sensitive Solutions

Building Successful Projects through Collaboration, Consensus, and Community Involvement

2006: March 7-8, Shoreline; March 15-16, Lacey; April 4-5, Spokane. **Free.** Instructors: John Heinley and Robert Kutrich, WSDOT. This course will provide the knowledge and skills to collaboratively develop transportation projects addressing the needs of a broad range of users and interested parties. Participants will learn to identify critical issues, involve stakeholders, evaluate alternatives and minimize tort liability when developing solutions to transportation issues that are specific to individual sites.

Contract Specification Writing

2005: November 8, Mount Vernon

2006: May 23, Vancouver; September 13, Seattle; October 19, Tumwater; November 7, Bellingham. **$75.** Instructor: Steve Boesel. This class will provide guidance and methods for writing consistently clear, concise, complete and well formatted contract special

provisions. It will provide a thought process that can be used when writing or reviewing contract specifications to ensure the greatest possibility for a successful bid and a successful construction project.

Electrical-Illumination and Signals

2005: November 8, Lacey. **$50.** Instructor: Mark Scheuffele, WSDOT Olympic Region Construction Trainer. This course will review plans, materials, and installation requirements for illumination and signal systems per WSDOT standards as follows: Provides an overview of the construction elements of the installation of signals and illuminations systems, discusses review and approval of shop drawings, identifies key components of illumination and signal systems, covers staking locations of luminaries and signals, includes information on collecting required material samples, identifies required documentation, provides a comprehensive course manual containing outlines of the duties of an inspector and references to critical specifications.

Modern Chip Seal Techniques

2006: April 11, Spokane; April 13, Yakima; April 18, Arlington; April 19, Tukwila; April 20, Tumwater. **$50.** Instructor: Phil Barto, P.E., retired Spokane Co. Operations Engineer. This course will cover: Asphalt chemistry, the purpose of chip sealing, asphalt and aggregates for chip sealing, design, supervising the chip seal crews, equipment preparation, calibration and maintenance, constructing a chip seal, weather conditions, and cost management.

Pavement Condition Rating

2006: May 9-10, Ellensburg; May 23-24, Tacoma; September 12-13, Tacoma. **Free.** Instructor: Bob Brooks, WST2 Pavement Engineer. Participants will learn to rate any of the pavements commonly found in Washington. The rating values obtained using the definitions and methods learned in this course should compare favorably with those obtained and used in the Washington State Pavement Management System. Each participant should be able to perform a pavement condition survey with reasonable objectivity.

Purchasing, Bidding and Contract Management for Local Agencies

2005: November 16, Kent. **$75.** Instructors: John Carpita, Municipal Research & Services Center of Washington, K. Wendell Adams, City of Yakima, and Dick Andrews, Perteet, Inc. Topics to be discussed:

- ***Purchasing and Bidding Overview*** – statutes that affect local agencies in purchasing goods, materials and services.
- ***Public Works Contracting*** – procedures, checklists, files; contract documents; bidding and contract award issues; contract administration and closeout; retainage and bonding; sales and use tax issues; exemptions; small works projects; emergency contracts; prevailing wage issues; contractor licensing, bond and insurance requirements.
- ***Consultant Selection*** – types of consultants; quality-based selection vs. bids; selection process; contract negotiations.

Roadway Drainage

2006: May 4, Moses Lake; May 9, Mount Vernon; May 11, Lacey. $45. Instructor: Bill Heiden. This training is for anyone who works with rural roads and has responsibility for construction and/or maintenance of roadways. The class will cover the following topics:

- Basic Road Design Characteristics
- Basic Soil Characteristics
- Basic Hydrology (Drainage Areas, Runoff Factors, Rainfall Intensity)
- Hydraulics (Culvert Materials, Sizing Culvert, Sizing Ditches)
- Placement of Culverts
- Culvert End Treatments
- Culvert and Ditch Maintenance

WSDOT Construction and Design Courses

Sixteen WSDOT courses are available for local agency attendance in the Design and Construction disciplines. Twenty percent of the seats in each class are reserved for Local Agencies. Attendance is limited to cities, counties, ports, tribes, transit agencies, and consultants acting as official city engineer. Classes are free. Registration is limited to one person per agency, per class. Classes are available in Seattle, Olympia, Vancouver, Yakima, Wenatchee, and Spokane.

Design training season is September through March. Dates for design classes are now posted on the WST2 training website and registrations are being accepted on-line. The five courses are listed here; approximately six to eight classes per course around the state.

- Roadside Safety (B74)
- Project Management Process (formerly titled Managing Project Delivery) (B71)
- WSDOT Interchange Design (CFU)
- Intersection and Pedestrian Design (CBD)
- Roadway Geometric Design (BWE)

Construction training season is January through May. Construction classes are becoming available now for the following eight courses. Register online.

- Excavation and Embankments Inspection (AC3)
- Nuclear Gauge Safety and Operation (ALG)
- Nuclear Gauge, Embankment/Surfacing/ Pavement Applications (ANQ)
- Electrical-Illumination and Signals (API)
- Drainage Inspection (ACF)
- Hot Mix Asphalt Placement (ACB)
- Bridge Structures Inspection (ACM)
- Bituminous Surface Treatment Inspection (ACC)
- Aggregate Production and Testing Inspection (ACA)
- Hot Mix Asphalt Production and Testing (B69)
- PCC Field Testing Procedures (ABT)

GIS/GPS Training

The following Basic, Intermediate and Advanced GPS training courses are available by special request to be held either in WSDOT's Tumwater computer lab or your agency. Four to six students per session. The courses are taught by WSDOT's Trimble-certified instructor. Expenses of the instructor are in lieu of the cost of the course if you choose to have the training in your agency. Call the WST2 office for information or to schedule training.

- **Basic Mapping and GPS Certified Training –** A one-day course. $100 per person. This course teaches the basics of GPS and how to collect data using Trimble Mapping and GIS/GPS equipment. Course topics are: GPS fundamentals, configuring the GPS equipment, field data collection techniques, and a field data collection session including downloading collected data to an office workstation. The training will include both a classroom session and a field exercise.
- **Intermediate Mapping and GPS Certified Training –** A two-day course. $200 per person. This course includes all topics covered in the one-day training course, plus the following topics: mission planning, data dictionary creation, advanced data collection techniques, differential correction using GPS Pathfinder Office, exporting data to your GIS and two field sessions utilizing advanced data collection techniques. The training will include classroom sessions and two field exercises.
- **Advanced GPS Mapping Grade Equipment Training –** A two-day course. $200 per person. This course is designed to provide advanced knowledge and skills in GPS mapping grade equipment, mission planning, data collection, data processing, and field techniques. The training will enable personnel who collect data to improve skills and techniques in collecting and processing data.

TRANSPEED
University of Washington

Contact: Julie Smith
(206) 543-5539, toll free 1-866-791-1275
fax (206) 543-2352
jsmith@engr.washington.edu
http://www.engr.washington.edu/epp/esa/reginfo.html

Endangered Species Act 4(d) Training Program

To register for a class in this section, use the contact listed above.

The Regional Road Maintenance ESA Training Program courses offered by the University of Washington include the following courses. Check their website for descriptions of courses, and dates and locations of class sessions.

Track 2: Introduction, Design and BMPs, Monitoring, and Environmental Roles for Engineering, Technical and Scientific Staff

Track 3: Classroom Introduction to ESA and Outcome-based Road Maintenance for Field Crews

Track 3B: Field BMP Training for Bridges Consistent with NPDES

Track 3F : Road Maintenance Crew Training in the Field Environment: Applying Maintenance BMPs

Track 3W: Road Maintenance Crew Training in the Field Environment: Applying BMPs in Water Work
(course currently under development)

TRANSPEED
University of Washington

Contact: Christy Pack
(206) 543-5539, toll free 1-866-791-1275
fax (206) 543-2352
http://www.engr.washington.edu/epp

To register for a class in this section, use the contact listed above.

The prices in this section are for local agency/non-local agency.

Manual on Uniform Traffic Control Devices

November 1-3, Spokane, $370/$570

Determining Contract Working Days

November 8, Lacey, $285/$385

Culvert Repair and Rehabilitation

November 15-16, Seattle, $285/$450

Basic Highway Capacity for Engineers and Planners

December 6-8, Lacey, $400/$575

Fundamentals of Traffic Engineering

December 13-15, Seattle, $400/$575

Work Zone Traffic Control Plan (TCP) Design

January 10-12, Seattle, $390/$590

Advanced Highway Capacity Analysis for Engineers and Planners

January 17-19, Seattle. $485/$685

Associated General Contractors Education Foundation

Contact Beth Sachse
(206) 284-4500, fax (206) 284-4595
bsachse@agcwa.com
http://www.constructionfoundation.org

To register for a class in this section, use the contact listed above.

Construction Site Erosion and Sediment Control Certification

These WSDOT approved classes are presented by the AGC Education Foundation and available on the following dates:

Tentative Dates for 2005/2006: November 18, Olympia; December 16, Bellingham; January 27, Yakima; February 24, Seattle; March 24, Everett; April 21, Tacoma; May 19, Seattle; June 23, Tacoma; July 21, Seattle.

Certification and recertification training on the same day. $250/$225.

AASHTO
Roadside Design Guide, Web-based Training

NHI Course Number: 380032C

This web-based course is approximately 14 hours long and is available anytime — 24 hours, 365 days a year via the Internet. The cost for non-FHWA employees is $230 per participant and includes a copy of the 2002 AASHTO "Roadside Design Guide." This course provides an overview of the 2002 AASHTO "Roadside Design Guide." Emphasis is on current highway agency policies and practices. Participants must register on-line at ***http://www.nhi.fhwa.dot.gov/registerdl.asp***

Computer Requirements: You will need a fairly recent version of a browser (such as Internet Explorer 4 or 5 or Netscape 4 with JavaScript enabled), the latest version of Macromedia Shockwave and Flash (which you can download from the Internet), and a connection to the Internet (at least 56K modem). An older computer such as a Pentium 100 would work, but it would be slower than a Pentium III. For more information, visit ***http://www.nhi.fhwa.dot.gov***

Other Training Programs for Local Agencies

Engineering Professional Programs (EPP)

University of Washington
(206) 543-5539
Engineering Refresher Courses
http://www.engr.washington.edu/epp

Professional Engineering Practice Liaison (PEPL)

University of Washington
(206) 543-5539
http://www.engr.washington.edu/epp

Washington Environmental Training Center

Green River Community College, Auburn
1-800-562-0858
http://www.greenriver.edu/wetrc

Click, Listen and Learn

American Public Works Association
(816) 472-6100
http://www.apwa.net/education/cll/

Washington State Emergency Management Division

(253) 512-7048 or (253) 512-7000
http://emd.wa.gov/

Washington State Department of Personnel (DOP)

Human Resource Development Services
(360) 664-1921
http://hr.dop.wa.gov/training

Evergreen Safety Council

(206) 382-4090 or 1-800-521-0778
http://www.esc.org

Conferences

APWA Fall Conferences

Spring 2006: March 28-31, 2006, Vancouver Convention Center. Joint Oregon/Washington. Contact Katherine Claeys at (360) 676-6961.

Fall 2006: October 16-20, 2006, Wenatchee Convention Center. Contact Ruta Jones at (509) 664-3364 or Dick McKinley at (360) 676-6961 for information about either of these conferences or http://www.apwa-wa.org/

Road and Street Maintenance Supervisors' Conference

December 6-8, 2005, Bellevue. For information, contact Michelle Johnson at mlj@wsu.edu at Washington State University or http://capps.wsu.edu/rs/

Pacific Northwest Transportation Technology Expo

September 2006, Chehalis. For a tour of previous events, http://www.wsdot.wa.gov/ta/T2Center/TechnoExpo/

Infrastructure Assistance Coordinating Council (IACC) Conference

November 8-10, 2005, Wenatchee Convention Center, Wenatchee. Contact Bill Cole for information at (360) 586-4125 or billc@CTED.wa.gov

Road Builders' Clinic

February 28-March 2, 2006, Coeur D'Alene Hotel, Coeur D'Alene, Idaho. Contact Washington State University at (509) 335-3530 for more information.

Mousetrap Registration

Name of Invention: _____

Agency: _____ (WSDOT) Region: _____

Mailing Address: _____

City: _____ State: _____ Zip+4: _____

Contact Person: _____

E-mail Address: _____

Phone: ( ) _____ Fax: ( ) _____

Inventor(s)/Fabricator(s): _____

E-mail Address: _____

Phone: ( ) _____ Fax: ( ) _____

Supervisor's Name: _____

What prompted this invention (or equipment modification)?

_____

_____

_____

_____

How was it developed?

_____

_____

_____

_____

Labor, Equipment, Materials Used (from scrap pile? Did you purchase any parts?):

_____

_____

_____

Cost Estimate (a rough guess will do):

_____

Benefits to your operations:

_____

_____

_____

Include sketches or plans of your "Better Mousetrap" with dimensions and materials identified, and photographs of the item from all angles (front, top, side, etc.) with the inventors in the photo if possible, to:

Build a Better Mousetrap
WSDOT-WST2 Center
PO Box 47390
Olympia, WA 98504-7390

For more information and photos of Mousetraps and Expo, check the Washington State T2 Center's web page:
www.wsdot.wa.gov/TA/T2Center/t2hp.htm
or contact Wendy Schmidt at (360) 705-7386 for details.

You can now register your Mousetrap online at: **http://fmapps.wsdot.wa.gov/mousetraps/Register.htm**

Washington State Technology Transfer Center
WSDOT – H&LP Division
PO Box 47390
Olympia, WA 98504-7390

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